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ABSTRACT

This report examines the prevalence of selected accomplishments and difficulties in a national sample of 4,423 children from 3 to 5 years of age who had not yet started kindergarten. The data were collected as part of the 1993 National Household Education Survey (NHES). The report focused on 2,000 children who had turned 4 by the end of 1992 and were about 6 months away from starting kindergarten. It found that more than 9 out of 10 of these 4-year-olds could button their own clothes and hold a pencil properly, and that more than 8 out of 10 could identify the primary colors by name. Only about 6 in 10 could count to 20 or recognize most letters of the alphabet, however. The report also found that more girls than boys demonstrated each of the literacy and small motor skills covered in the survey, and that Hispanic preschoolers were reported to show fewer signs of emerging literacy and to be in less good general health than white and black children. A discussion of survey methodology and data reliability is included. Two appendices provide information on interview items and regression analysis of sociodemographic risks. (Contains 75 references.) (MDM)

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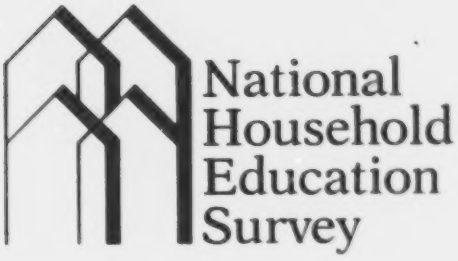

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The art for the cover of this report was drawn by Elizabeth I. Gorman, age 5.

Executive Summary

Kindergarten is now a nearly universal experience for children in the United States: 98 percent of children attend kindergarten prior to entering first grade. However, the population of children that comes to kindergarten is increasingly diverse. Growing numbers of children in the United States come from a variety of racial, ethnic, and cultural backgrounds, family types, parent-education levels, income strata, and language backgrounds. Young children also differ in the types of preschool experiences they bring to kindergarten. The majority of children come to kindergarten with some experience in center-based programs such as day care centers or preschools. The percentage of children with such experience varies, however, across groups with different backgrounds and characteristics.

Schools in the United States are expected to respond to this diversity in children's backgrounds and educational needs, furnish all children with appropriate activities and instruction, and get each child off to a good start in his or her schooling. An understanding of the range of accomplishments and difficulties that children bring with them when they arrive at kindergarten can aid in understanding the demands being placed on schools and the needs of the entering children. Indeed, some of the difficulties discussed here are only experienced as difficulties when children enter school. Information about the developmental characteristics of preschoolers is also relevant for assessing where the United States stands with respect to one of the eight National Education Goals: "By the year 2000, all children in America will start school ready to learn."

This report examines the prevalence of selected accomplishments and difficulties in a national sample of 4,423 children from 3 to 5 years of age who had not yet started kindergarten. The accomplishments and difficulties examined in this report represent characteristics related to dimensions or domains of development that are important to a child's early learning: physical well-being and motor development, social and emotional development, language usage, and general knowledge. The accomplishments consist of signs of emerging literacy and numeracy, such as pretending to read stories or counting to 20, and small motor skills, such as buttoning clothes and holding a pencil properly. The difficulties encompass signs of physical activity-attention difficulties, speech difficulties, and less than optimal health. The determination of whether the child displayed each of these accomplishments and difficulties is based on reports from one of the child's parents, usually the mother. These data were collected in January through April 1993 as part of the National Household Education Survey.

The study focuses on 2,000 children who had turned 4 by the end of 1992 and were about 6 months away from starting kindergarten at the time of the survey. A majority of these 4-year-olds displays each of the small motor skills and signs of emerging literacy asked about in the survey. The size of the majority, however, varies greatly across specific accomplishments: More than 9 out of 10 could button their own clothes and hold a pencil properly, and more than 8 out of 10 could identify the primary colors by name; but only about 6 in 10 could count to 20 or recognize most letters of the alphabet.

Much smaller fractions of preschoolers exhibit any of the developmental difficulties, although a substantial minority displays signs of physical activity-attention difficulties. At age 4, nearly 3 in 10 are said to be very restless and fidgety, and nearly 1 in 4, to have a short attention span. Nearly 1 in 8 is reported to be in less than very good health. About 1 in 13 speak in a way that is not understandable to a stranger or have a stutter or stammer.

The percentage of children displaying signs of emerging literacy and small motor skills increases with years of age within the 3- to 5-year age range, and with months of age among 4-year-olds. For example, the percentage of preschoolers reported to write their own names more than triples between ages 3 and 4, while the percentage recognizing most letters more than doubles. Other accomplishments show more moderate age differences. Developmental difficulties show much smaller changes across ages, and some show no change.

More girls than boys demonstrate each of the literacy and small motor skills covered in the survey, and more boys than girls exhibit signs of physical activity-attention difficulties or speech difficulties. Though differences by sex are widespread, they are not large.

Hispanic preschoolers are reported to show fewer signs of emerging literacy and more indications of physical activity-attention difficulties, and to be in less good general health than white non-Hispanic or black non-Hispanic children.[1] Controlling for related risk factors such as a mother with limited education and minority-language status reduces these ethnic differences but does not eliminate them. Black preschoolers show fewer signs of emerging literacy and less good health than white preschoolers. However, racial differences are wholly accounted for by related risk factors such as low maternal education, poverty, and single parenthood.

The accomplishments and difficulties that children bring with them when they arrive at kindergarten are correlated with sociodemographic risk factors that have been found to be associated with learning difficulties after children start school. Five family risk factors are examined: The mother has less than a high school education; the family is below the official poverty line; the mother speaks a language other than English as her main language; the mother was unmarried at the time of the child's birth; and only one parent is present in the home. Half of today's preschoolers are affected by at least one of these risk factors, and 15 percent are affected by three or more of them.

Risk factors are found to be associated with fewer accomplishments and more difficulties in children, even after other child and family characteristics were controlled. Of the developmental domains, only small motor development is not found to be related to any of the risk factors. In general, the more risk factors the child is subject to, the lower the number of accomplishments and the higher the

[1]Throughout this report, references to white children refer to white non-Hispanic children, and references to black children refer to black non-Hispanic children.

number of difficulties he or she is likely to have exhibited. Compared to children from families with no risk factors, twice as many 4-year-olds from families with three or more risk factors have short attention spans (37 percent versus 17 percent) and nearly double the number are said to be very restless (41 percent versus 22 percent). Three times as many speak in a way that is not understandable to strangers (14 percent versus 5 percent) or stutter or stammer (16 percent versus 5 percent). Almost five times as many are in less than very good health (23 percent versus 5 percent). Four-year-olds from families with three or more risk factors have nearly one-and-a-half *fewer* literacy accomplishments (an average of 2.5 out of five) than those from families with no risk factors (who have an average of 3.9 accomplishments).

The relative importance of individual risk factors varies across developmental domains. Low maternal education and minority-language status are most consistently associated with fewer signs of emerging literacy and a greater number of difficulties in preschoolers.

The study shows that attending Head Start, prekindergarten, or other center-based preschool programs is linked to higher emerging literacy scores in 4-year-olds. The increase, which amounts to an average of nearly one full accomplishment out of five, remains statistically significant when other child and family characteristics are controlled. This benefit of preschool attendance accrues to children from both high-risk and low-risk family backgrounds. On the other hand, preschool attendance is found not to be associated with fewer behavioral or speech difficulties, or with better health status in preschoolers. It is possible that further research taking into account measures of quality (e.g., child-staff ratio) would show some effect in these other domains.

The results of the study point to a need for innovative approaches to the provision of early education services to disadvantaged children. As previous studies have shown, existing preschool programs have beneficial effects in the area of emerging literacy and numeracy. But they do not appear to be ameliorating the behavioral, speech, and health difficulties of disadvantaged preschoolers. The need for earlier and more effective interventions for young children with special educational needs has been recognized in federal legislation.

The results also demonstrate that educational risk is a multifaceted phenomenon. Five different risk factors are employed in the present study. All are found to have some relationship to preschoolers' accomplishments and difficulties, although the pattern of relationships varies across developmental domains. Many observers believe that low family income is *the* key factor behind educational failure, but the results of this research do not support this view. When compared to low family income, the risk factors of low maternal education, minority-language status, and family structure are often as good or better predictors of the child's developmental accomplishments and difficulties.

By showing the considerable variation that exists in the accomplishments and difficulties of children about to start school, the study highlights the challenges that kindergarten teachers face in meeting the needs of children who are not only demographically but developmentally diverse. Teachers

must maintain the interest and promote the growth of children who have already demonstrated signs of early literacy and numeracy while simultaneously encouraging the emergence of basic skills in children who have not yet acquired them. Similarly, they must meet the needs of children with difficulties while reserving sufficient attention and effort for those with few or no difficulties. While there has always been variation in children entering kindergarten, the commitment to meeting the educational and developmental needs of *all* children in an increasingly diverse society presents greater challenges to teachers and schools.

Achieving this goal requires that early childhood programs and classrooms be organized to meet the needs of children at all levels of development, that teachers be selected who have the energy, warmth, and imagination to respond to young children with varying capabilities and needs, and that these teachers be appropriately trained and provided with sufficient resources and assistance so they do not have to neglect some children in order to nurture others. There is still much to learn about how well kindergarten programs around the country are meeting these requirements.

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Introduction

Kindergarten is now a nearly universal experience for children in the United States. The results of a 1991 national survey indicate that 98 percent of primary school children attended kindergarten prior to entering first grade (West et al. 1991).[2] However, the population of children that comes to kindergarten is increasingly diverse. Growing numbers of children in the United States come from a variety of racial, ethnic, and cultural backgrounds, family types, parent-education levels, income strata, and language backgrounds. Young children also differ in the types of preschool experiences they bring to kindergarten. The majority of children come to kindergarten with some experience in center-based programs such as day care centers or preschools. The percentage of children with such experience varies, however, across groups with different backgrounds and characteristics (West, Germino Hausken, and Collins 1993a; Hofferth et al. 1993).

Schools in the United States are expected to respond to this diversity in children's backgrounds and educational needs, furnish all children with appropriate activities and instruction, and get each child off to a good start in schooling. Schools are also being asked to offer services and experiences that families and other institutions provided in the past, for example, meals and before- and after-school child care. An understanding of the range of accomplishments and difficulties that children bring with them when they arrive at kindergarten can aid in understanding the demands being placed on schools. Such knowledge can also assist teachers and administrators in planning kindergarten programs and in obtaining sufficient resources to manage classrooms composed of children with differing needs and capacities. This report provides findings from a national study, the 1993 National Household Education Survey (NHES:93), based on parent reports of their children's developmental accomplishments and difficulties. Variations in these characteristics are examined across a set of sociodemographic risk factors and preschool experiences.

The report addresses five main research questions:

- How much variation is there in the developmental accomplishments and difficulties of a national sample of 3- to 5-year-olds who have not yet started kindergarten? For example, what percentage of preschoolers are able to identify colors by name, hold a pencil properly, speak in a way that is understandable to strangers, or are in very good or excellent health? How do these percentages vary by age, sex, and race and Hispanic origin?

- How do the amount and pattern of variation differ across developmental domains? For example, does the development of emerging literacy show a different pattern of variation

[2]The percentage of primary school children who were reported to have attended kindergarten in the survey that is the subject of this report, the 1993 National Household Education Survey, is identical, i.e., 98 percent.

across groups with different backgrounds and characteristics than the development of small motor skills?

- Do family background factors, such as poverty and low parent education levels, that have been found to be associated with learning difficulties after children start school also correlate with the accomplishments and difficulties that children bring with them when they arrive at kindergarten?

- In predicting the accomplishments and difficulties of preschool children, are some family risk factors more important than others? Or is the *number* of risks that a child has more important?

- If there is a substantial gap between the preschool accomplishments of children from high-risk family backgrounds and those from more advantaged families, does attending a center-based preschool program help close the gap by boosting the accomplishments of disadvantaged children? Does attending a center-based program make more of a difference in some developmental domains than in others?

School Readiness and Children's Developmental Status

The school readiness of young children is an area of considerable interest and debate in current educational policy. One of the National Education Goals states that, "By the year 2000, all children in America will start school ready to learn."[3] There is not universal agreement within the educational community as to the criteria for defining or assessing a child's readiness for school. Indeed, some educators question the usefulness of readiness as a concept (Crnic and Lamberty 1994; Eisenhart and Graue 1990; Ellwein et al. 1991; Shepard and Smith 1986). Some emphasize the need for *schools* to be ready for *children* (Barnett 1992; Lamberty and Crnic 1994; Shepard and Smith 1988). There is general agreement, however, that how a child does in school depends in part on things that happen before he or she ever enters a kindergarten classroom. Measures of the development and well-being of children as they enter school can provide important indicators of how young children are being nurtured in our society and of the challenges faced by teachers and schools in preparing curricula to meet the needs of diverse populations of children.

Most child development specialists consider school readiness, like child development itself, to be a multifaceted phenomenon (Resource Group on School Readiness 1991; Zill and Coiro 1992). The Goal One Technical Planning Group of the National Education Goals Panel has identified five dimensions or

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[3]The Goals 2000: Educate America Act, signed by President Clinton on March 31, 1994, sets into law eight National Education Goals for the year 2000. The original six goals were developed in 1989 at a conference of America's governors and the President; Congress added two new goals in 1994. The goal regarding school readiness was one of the original goals.

domains of development that are important to a child's readiness for school: physical well-being and motor development, social and emotional development, approaches to learning, language usage, and cognition and general knowledge (Goal One Technical Planning Group 1993). The Group has recommended that any attempt to assess children's school readiness should involve the direct assessment of children themselves, as well as the collection of information from parents and teachers. No such comprehensive, multimethod assessment of the developmental status of a representative sample of U.S. preschoolers or kindergartners is currently available.[4] Until a direct assessment is conducted, surveys based on reports by parents or teachers can help provide preliminary indications as to the developmental status of children about to enter school; however, these measures are not substitutes for direct assessments.

This report presents estimates of the frequency of selected developmental accomplishments and difficulties among preschoolers[5] in the United States, based on information reported by their parents. The aim of the report is *not* to make an overall judgment on the school readiness of American children, but rather to provide insights into what today's children who are soon to enter kindergarten are like, in terms of both their positive achievements and some of the problems they are experiencing that are potentially relevant to school performance and adjustment. The analysis seeks to ascertain how preschoolers' accomplishments and difficulties change from age 3 to age 5 and to examine the relationship between several selected risk factors and these accomplishments and difficulties among 4-year-old preschoolers, the largest population of children who will soon be entering kindergarten.

Why Early Accomplishments and Difficulties Matter

When considering the accomplishments and difficulties of preschoolers, it is important to bear in mind that most teachers do *not* consider some of the specific skills reported here as necessary for kindergarten entry. For example, in a recent national survey of kindergarten teachers, only 21 percent consider it "essential" or "very important" for a child to be able to use pencils or paint brushes to be ready to start kindergarten. Likewise, only 10 percent consider it very important for the child to know the letters of the alphabet, and just 7 percent deem it very important for children to be able to count to 20 or more at the time they entered kindergarten (Heaviside and Farris 1993).

The child characteristics that a majority of the teachers consider essential or very important for school readiness are being well nourished and rested (96 percent), being able to communicate needs,

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[4]The Child Supplement to the National Longitudinal Survey of the Labor Market Experiences of Youth (NLSY-CS) comes close to being such an assessment, but it will not be fully representative of American preschoolers until the children of late childbearers in the sample reach kindergarten age (Baker and Mott 1989). A multimethod assessment is currently being designed by the National Center for Education Statistics and planned for implementation in 1998.

[5]Preschoolers are defined in this report as children 3 to 5 years of age as of December 31, 1992, who had not yet enrolled in kindergarten. Using this definition, nearly all 3- and 4-year-olds, and about one-quarter of 5-year-olds, predominantly those who have birthdays late in the year, are preschoolers.

thoughts, and wants verbally (84 percent), being enthusiastic and curious in approaching new activities (76 percent), and taking turns and sharing (56 percent) (Heaviside and Farris 1993; West, Germino Hausken, and Collins 1993b). However, even if preacademic skills such as identifying colors, recognizing letters, and counting are not requirements for kindergarten entry, they are important for two reasons. First, knowing what skills children have and have not yet learned is important for curriculum planning and the allocation of instructional resources. Second, early accomplishments and difficulties are predictive of later academic performance—not perfectly so—but enough to make large developmental differences among groups of children a cause for educational concern. Let us elaborate briefly on each of these points.

Planning Programs and Allocating Resources. If the kindergarten pupils who attend a given school vary widely in their developmental accomplishments or a large proportion of them exhibit developmental difficulties, the school must be prepared to offer a broad array of activities and materials to the students or risk having some be unchallenged and bored, while others must struggle to keep up with the class. It certainly is possible to carry on a diverse set of learning activities, even in a single classroom, provided the group size and child-to-staff ratio are not too large, and the main teacher is skilled and energetic enough to manage a class in which many different things are happening at once.

The 1993 national survey of kindergarten teachers mentioned earlier shows that 72 percent of all public school kindergarten teachers have classes of 20 or more pupils, and 25 percent have class sizes of 26 or more. In 39 percent of public kindergarten classes, the teacher does not have a paid adult assistant to help with the students, and the average child-to-staff ratio across all public kindergarten classes is 15:1 (Heaviside and Farris 1993). Guidelines propounded by the National Association for the Education of Young Children (NAEYC) call for kindergartners to be in classes of no more than 20 children with 2 adults, implying a child-to-staff ratio of only 10:1 (Bredekamp 1987). Clearly, many existing kindergarten classes fail to meet the NAEYC guidelines. This suggests that teachers in these classes may have a difficult time coping with pupils with widely varying accomplishments or large numbers of developmental difficulties.

Predicting Later Achievement. The specific accomplishments and difficulties selected for the NHES:93 were chosen in part because they had been shown to correlate significantly with children's scores on the General Cognitive Index of the McCarthy Scales of Children's Abilities,[6] an assessment of cognitive development in preschoolers (Henderson 1991; McCarthy 1970). The General Cognitive Index has, in turn, been shown to be among the best of an array of preschool predictors of children's later academic achievement (Horn and Packard 1985). However, preacademic skills represent just one of several domains that are important to a whole-child developmental perspective. Children's physical activity and attention levels are behavioral dimensions that are important to society and to school (Pellegrini and Horvat 1995). Another fairly good predictor of later achievement, or rather, of

[6]See section "Specific Developmental Areas Examined" below for further information on the item selection process.

achievement difficulties, is a syndrome that is often labeled *hyperactive behavior* or *hyperactivity*. Some of the characteristics of this syndrome include a short attention span, extreme restlessness, mental confusion, fidgeting, and motor clumsiness (Horn and Packard 1985; Pellegrini and Horvat 1995). Items indicative of this behavior pattern were also part of the NHES:93 developmental questionnaire, but these few items as reported by parents should not be viewed as diagnostic

To be sure, the prediction of later academic achievement based on preschool accomplishments and difficulties is far from perfect, especially at the level of the individual child. Like physical growth, mental growth does not proceed at a constant rate for all individuals; there are spurts and lags at different periods in each person's development (Jensen 1980). Although extremely early or extremely late accomplishment of basic skills may foreshadow great talent or the presence of a developmental disability (Willerman 1979), individual differences in development within the normal age range are not necessarily significant (McCall 1970). Generally speaking, assessments made at early ages are less predictive of achievement in adolescence than assessments made in the third grade or later (McCall 1987; Cardon et al. 1992). Furthermore, the fact that a young child can recite the alphabet or count from 1 to 20 may simply reflect that the child has been drilled to perform the task by rote, rather than having a real understanding of the information involved (Bredekamp 1987).

Nevertheless, when children's accomplishments and difficulties are combined into composite scores, the scores tend to be more stable and predictive of differences in later achievement (Laosa 1992; Horn and Packard 1985). Also, average developmental differences among groups of children tend to be more reliable and prognostic than differences between individuals (Sattler 1992). Groups of youngsters who show substantially fewer accomplishments and more difficulties as preschoolers may well require more challenging instruction and special education resources as elementary and secondary school students (Knapp, Shields, and Turnbull 1992). The persistence of sizable developmental differences between young children from low-income or low-education families and more advantaged children suggests that attempts to "level the playing field" by providing early interventions and compensatory resources have not gone far enough or are not succeeding for other reasons.

There are many potential applications of data on young children's accomplishments and difficulties for educational planning, prediction of future resource needs, and policy guidance. Thus, there is much to be gained in understanding how parent reports of children's statuses on several developmental dimensions are distributed and how they are associated with characteristics of children and their families that put them at risk.

Factors That May Influence Child Development

In this section, we discuss several factors that may have an impact on a child's developmental accomplishments and difficulties. These include sociodemographic risk factors, such as maternal language and education, poverty status, being born to an unmarried mother, and living in a single-parent

household. Preschool experience is generally thought to have a positive effect on children's development as it relates to preparedness for school, and is associated with lower rates of grade retention. Other factors, including sex, race-ethnicity, and month of birth are included to show the relationship of these basic child characteristics to development and to control for variations in the demographic characteristics of different risk groups (see the section entitled "Other Measures of Interest," below).

Sociodemographic Risk Factors

The objectives spelled out under the National Education Goal on school readiness draw attention to two groups of children whose developmental status is of particular concern to the Nation. One of these groups consists of young children who are disadvantaged, either economically or socially; the other, of young children with disabilities (U.S. Department of Education 1995).

Several family background characteristics have often been found to be associated with poor educational outcomes among school-aged children, such as low achievement test scores, grade repetition, suspension or expulsion, and dropping out of high school. These include coming from a family whose annual income is below the official poverty level (Zill et al. 1995), having parents who have not completed high school (West and Brick 1991; Collins and Brick 1993; Bianchi and McArthur 1993; Sattler 1992), being born to a mother who was unmarried at the time of the child's birth (Prince, Nord, and Zill 1993), living in a single-parent family (Dawson 1991), and having a mother who speaks a language other than English in the home (Bianchi and McArthur 1993).

Students who have one or more of these characteristics—a group that may comprise as many as half of all schoolchildren in the United States—are considered educationally disadvantaged or "at risk" of school failure (Pallas, Natriello, and McDill 1989). Although not all pupils with one or more of these characteristics will do poorly in school, those with such risk factors have, on average, a greater chance of low achievement than those without any risk factors. Furthermore, these characteristics often occur together, as in families started by unmarried high school dropouts who receive no support from the fathers of their children and live in poverty or depend on welfare (Haffner et al. 1992; Kaufman and Bradby 1992; Nord and Zill 1993).

Children from "multiple risk families" may be most in danger of school failure. Researchers have found a linear relationship between a cumulative risk score and measures of verbal IQ and social adjustment in 4-year-old children (Sameroff et al. 1987), with vocabulary and math test scores in 4- and 5-year-olds (Nord et al. 1994), as well as with the chances of grade repetition or suspension in school-aged children or adolescents (Prince, Nord, and Zill 1993). These results have led some to speculate that the number of risk factors there are in a child's background may be more important than the nature of the particular risk or risks (Meisels and Wasik 1990).

This report examines whether the same family factors that are associated with poor performance in school-aged children also increase a child's chances of showing fewer developmental accomplishments and more developmental difficulties as a 4-year-old preschooler. We also construct a cumulative risk index and compare the strength of its relationship with child development with the relationship of child development and individual risk factors.

Preschool Experience

The school readiness objectives of the National Education Goals commit the Nation to increased participation by preschoolers in high-quality child care and early education programs. Increased access to these programs is seen as especially important for children who are disadvantaged or disabled (U.S. Department of Education 1995).

The percentage of children entering kindergarten who have had some form of nonparental child care by relatives, nonrelatives, or in centers has increased with the participation of women in the work force. The labor force participation rates of women with 3- to 5-year-old children increased from 32 percent in 1970 to 55 percent in 1990 (West, Germino Hausken, and Collins 1993a; U.S. Bureau of the Census, various years). In 1990, 54 percent of mothers whose youngest child was 3 or 4 years of age were in the labor force, and among these women, about two-thirds were employed full time (U.S. Bureau of the Census 1992).

In 1991, 68 percent of preschoolers were currently receiving some form of nonparental care or were participating in early childhood programs, and 80 percent had ever done so (West, Germino Hausken, and Collins 1993a). Among 4-year-old preschoolers, 73 percent were participating in current nonparental care arrangements or programs, and 84 percent had ever participated. The percentage of children who had ever attended a center-based program (including day care centers, Head Start, or nursery schools) was associated with family income and parental education levels: Those in disadvantaged households were less likely to participate in these early childhood programs. In addition, Hispanic preschoolers, as a group, were found to be less likely than others to have early childhood program experiences. This is consistent with previous research indicating that Hispanic children are less likely to attend center-based programs, but more likely to receive care from a relative, that white children (West et al. 1993)

Analyses by Bianchi and McArthur (1993) and Collins and Brick (1993) indicate that attending center-based preschool or child care programs reduces a child's chances of having to repeat kindergarten or first grade, even after socioeconomic differences are controlled. There is evidence that participation in Head Start and other preschool programs can increase children's cognitive test scores, although the gains appear to fade by the time children reach the third or fourth grade (Lee, Brooks-Gunn, and Schnur 1988; McKey et al. 1985). Some programs show longer term effects in terms of reducing grade retention and special education placement (Haskins 1989; White 1986).

Barnett (1992) notes that the public has become convinced that preschool experience (i.e., participation in a center-based program) enhances children's preparation for school and supports long-term success. While the analyses cited above suggest some benefit from preschool participation, Barnett notes that public prekindergarten programs may not necessarily convey the benefits of exemplary programs that were studied in the past (e.g., the Perry Preschool Study). He also notes that much of the research on preschool effects is now dated, and that considerable social change has taken place in the years since some of the major preschool studies were conducted. Ongoing examination of the relationship between center-based program participation and other early childhood experiences, accomplishments, and difficulties is therefore needed.

In this report we examine whether participation in a center-based preschool or child care program (i.e., a day care center, nursery school, preschool, prekindergarten, or Head Start program) is associated with more signs of developmental accomplishments or fewer developmental difficulties in 4-year-olds, controlling for a variety of child characteristics and sociodemographic factors correlated with preschool participation. No attempt is made to consider the quality of the center-based program or programs the child attended, as it was not possible to adequately assess program quality with the NHES:93 data collection mechanism. In addition to evaluating whether preschool participation has an overall effect on the developmental measures, we examine whether the effect of participation is greater for children who have one or more educational risk factors.

Other Measures of Interest

While some authors consider racial or ethnic minority group status to be a risk factor, race-ethnicity is not treated as such in this analysis. Rather, race-ethnicity is included in the tabulations and is treated as a control variable. The reason for this is that race and ethnicity are not actionable by private choices or public policies the way such factors as parent education level, poverty status, and preschool program participation potentially are. At the same time, children from some racial or ethnic groups, for example Hispanics, are underrepresented among children who attend center-based programs. Furthermore, Hispanic families and black families tend to have lower education and income levels, on average, than non-Hispanic white families, and Hispanic parents are more likely to speak a language other than English at home. There may also be other, unmeasured characteristics of minority families that correlate with their children's reported accomplishments and difficulties. For example, minority parents may have different styles of responding to survey questionnaires than nonminority parents.[7] Therefore, it is desirable to take the differing racial and ethnic compositions of various risk groups into consideration when comparing, say, the developmental accomplishments of children who did or did not attend center-

[7]For example, Bachman and O'Malley (1984) found that, in self-attitude items using Likert-type response categories, black respondents were more likely to select the responses at either end (strongly agree, strongly disagree) than were white respondents. This does not necessarily suggest, however, that differences in reporting behavior (e.g., counting, buttoning clothes, or program participation) would be observed.

based programs. The child's sex is also included in the tables and as a control variable for similar reasons.

Several researchers have noted that girls tend to perform better than boys on measures such as readiness tests (Ellwein et al. 1991) and the Weschler Preschool and Primary Scale of Intelligence (Sattler 1992). However, Laosa (1982) did not find consistent sex differences among Chicano children on the Preschool Inventory. Other authors have noted the higher incidence of behavior problems among young boys (Achenbach 1982; Achenbach et al. 1991; Rutter, Tizard, and Whitmore 1970). Bianchi and McArthur (1993) found higher incidence of delayed school entry, kindergarten retention, and repeating first grade among boys. The presence of these sex differences in school entry and early school experience suggests that sex is an important variable in an analysis of the accomplishments and difficulties of young children.

In addition, because development occurs at a rapid pace in the preschool years, children born early in the previous year ("older 4's") may be more developmentally advanced than children born late in the previous year ("younger 4's").[8] Thus, even in analyses run on 4-year-old preschoolers only, the child's month of birth was included as a control variable. When a number of young children are present in a household, it may diminish the amount of parental attention and other family resources available to each child (Nord et al. 1994). Thus, the number of children under age 9 in the household was also included as a control variable.

Data Source: The National Household Education Survey

This report is based on data from the 1993 National Household Education Survey (NHES:93). The NHES is designed to use national telephone surveys of households to study topics that cannot be addressed adequately through institution-based studies. This approach is particularly useful for studies of populations such as preschoolers, who could not be sampled from institutional rosters, since no comprehensive sampling frames are available and many children are cared for in their own homes or in other private homes. In the NHES, households are sampled using random-digit-dialing methods and interviews are conducted using computer-assisted telephone interviewing (CATI) technology. The survey is designed to collect descriptive data that can be used to monitor issues that have a high priority with the Department of Education by targeting specific populations for detailed data collection. It is intended to provide more detailed information on topics and populations of interest than is typically available through supplements to existing household surveys, for example, the Current Population Survey (CPS).

Reports on the developmental accomplishments and difficulties of preschool children were collected in the NHES:93 from the parents and guardians of 4,423 preschoolers (that is, children age 3

[8]In the NHES:93 analyses, children's age was measured as of December 31, 1992. Parent interviews were conducted in the months of January through April of 1993.

and older who were not yet enrolled in kindergarten).[9] The sample represents a preschool population estimated to number some 8.6 million children nationwide. Weights were applied to help make the survey estimates applicable to the entire young child population, including those living in households without telephones.

Specific Developmental Areas Examined. The developmental accomplishments and difficulties included in this report are based on 19 items in the NHES:93 questionnaire administered to parents of preschoolers (Figure 1 and Appendix A). The set of items was intended to represent a number of different domains of children's development and well-being: emerging literacy and numeracy (7 items, of which 3 were combined to form the reading measure), small motor development (3 items), gross motor functioning (1 item), general health (1 item), social and emotional development (4 items), and speech development (3 items).

The items were drawn from several widely used early childhood data collection and diagnostic instruments, including a screening inventory and a readiness checklist used by public school teachers.[10] Some questions were written especially for the NHES, asking parents about school-related skills that have been tested in several early childhood assessment batteries. For example, the Developmental Indicators for the Assessment of Learning-Revised battery (DIAL-R) tests color naming, rote counting, letter naming, and writing first name, among other skills (Mardell-Czudnowski and Goldenberg 1990). The Metropolitan Readiness Test, the Early Childhood Assessment Test (Mason and Stewart 1993), and other batteries also assess some of the same accomplishments (Salvia and Ysseldyke 1991). An item derived from questions on whether the child pretended to read and told connected stories when doing so was inspired by Teale's work on the assessment of children's emerging literacy (1988, 1990).

Following analysis of the intercorrelations among these items, the indicators were grouped in a somewhat different way. That new grouping is described at the beginning of the Findings section and is reflected in the data presentations contained in Tables 1 through 7.

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[9]Information on survey methodology, response rate, and data reliability appears in the final section of this report.

[10]The parent questionnaire from the Early Screening Inventory (ESI) developed by Sam Meisels of the University of Michigan, and a readiness checklist formerly used by public school teachers in Maryland supplied by Doris Entwisle of Johns Hopkins University.

Figure 1.— Developmental accomplishments and difficulties included in the 1993 National Household Education Survey

Emerging Literacy and Numeracy

- Identifies all, some, or none of the primary colors by name
- Recognizes all, most, some, or none of the letters of the alphabet
- Counts not at all, to 5, 10, 20, 50, or to 100 or more
- Pretends to read telling connected stories
- Writes own name, even if some letters are backwards

Small Motor Development

- Can button clothes
- Holds pencil properly
- Writes/draws rather than scribbles

Gross Motor Functioning

- Trips, stumbles, or falls easily

General Health

- Health excellent, very good, good, fair, or poor

Social and Emotional Development

- Very restless, fidgets a lot
- Has short attention span
- Often has temper tantrums
- Can be left with babysitter without a big fuss

Speech Development

- Speech understandable to strangers
- Started speaking late
- Stutters or stammers

Several of the items included in the developmental accomplishments and difficulties presented in this report appear on kindergarten report cards.[11] While this suggests that it is important for children to acquire some of these accomplishments prior to *leaving* kindergarten, as noted earlier, there are many kindergarten teachers who do not consider these accomplishments essential or very important for kindergarten *entry*. Items were selected because of their demonstrated relevance to school performance or adjustment, or because they were found to correlate significantly with children's scores on a direct test of general cognitive development.[12] Other criteria were that the accomplishments should be ones that parents were likely to know about, and the difficulties should not be terribly rare in the general population of children. The set of questions was also designed to provide a rough balance between negatively worded and positively worded items.

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[11]For example, analyzing a sample of kindergarten report cards from Ohio, Freeman and Hatch (1989, 604) found that 92 percent included an item on letter recognition; 86 percent included an item on printing own name; 84 percent, knowing basic colors; 72 percent, dressing self; 44 percent, counting by rote; and 23 percent, having adequate attention span.

[12]Parents' reports of specific developmental difficulties were correlated with children's scores on the General Cognitive Index of the McCarthy Scales of Children's Abilities. The data were obtained from a doctoral dissertation conducted by Laura Whelchel Henderson (1991).

Most of the developmental items are dichotomous, yes-no questions, but a few have several possible response options representing a range of accomplishment (e.g., recognizes all, most, some, or none of the letters of the alphabet). For the analyses reported here, these items were dichotomized (e.g., recognizes all or most letters versus some or none).

The set of items should *not* be thought of as a comprehensive assessment of children's developmental status or school readiness. First, the set of items is relatively small and there are aspects of children's development and behavior that teachers and parents believe to be very important for school readiness that are not addressed by the developmental accomplishments and difficulties items in the NHES:93. Examples are the child's ability to communicate needs, wants, and thoughts verbally; his or her curiosity and enthusiasm in approaching new activities; and his or her ability to take turns, share, and cooperate with other children (Knudsen-Lindauer and Harris 1989, Heaviside and Farris 1993; West, Germino Hausken, and Collins 1993b). Second, a comprehensive assessment of children's developmental status would not rely solely on parent-supplied information, but would make use of information from teacher reports and direct assessment of the child (Goal One Technical Planning Subgroup 1991). Despite these limitations, the present survey findings provide useful insights into the status of young children and the population of children about to enter kindergarten.

Strengths and Limitations of Parent Reports. Parent recollections of what their children have and have not done are obviously not as objective as direct assessments by impartial observers.[13] Nonetheless, parents are an indispensable source of information about children's health, learning, and behavior, because they see children over long periods of time and in a variety of settings (Goal One Technical Planning Subgroup 1991; Rutter, Tizard, and Whitmore 1970). Parent responses to developmental inventories or structured child behavior scales have been found to have reasonable reliability (Achenbach and Edelbrock 1981; Baker and Mott 1989) and to be of considerable value in diagnosing developmental disorders in children (Graham and Rutter 1968; Meisels, Dorfman, and Steele 1992).

Parent reports about individual items of behavior or attainment have to be interpreted with caution, though, as some parents respond in idiosyncratic ways, and single responses tend to be less reliable than summary scores or composite scales (Schreiner 1983; Zill 1990). A reinterview study with a subsample of the NHES respondents showed moderate levels of inconsistency between parents' original and reinterview responses to the individual questions about their children's accomplishments and difficulties (Brick, Rizzo, and Wernimont 1993). Nevertheless, for half the items, more than 90 percent of the reinterviewed parents gave responses that were in agreement with their own earlier responses, and for most of the remaining items, between 81 and 89 percent of the parents gave consistent responses.[14]

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[13]Direct assessments have their own problems, such as whether a given sample of a child's behavior is truly representative of what the child has done in other situations.

[14]The reinterview findings are described more fully in the methodology section of this report.

Some of the accomplishments and difficulties reported in this research involve behaviors that can be objectively observed and reported, for example, the child's buttoning his or her clothes or writing his or her name. Other behaviors, including several of those that represent difficulties, require parents to make judgements about their child's behavior in comparison to norms that are less explicit and obvious, for example, evaluating the shortness of the child's attention span or how well his or her speech can be understood. For many children, these behavioral characteristics may not be experienced as difficulties until they enter school, and that experience may, in some cases, result from expectations by the school that are inappropriate for the child's age or developmental status.

Parents also vary in their opportunity to observe their children's accomplishments. Parents who frequently engage in formal or informal educational activities with their preschool children are not only likely to teach their children through these activities, but also to have a better idea of what their children can and cannot do than parents who do relatively little in the way of educational play. A parent's negative response to a particular developmental item may not mean that the child cannot do this thing, but merely that the parent has not observed the child doing it.

Published reports of direct observations or testing of children's accomplishments and difficulties directly comparable to the individual items collected in the NHES are limited. Those that are available are at least roughly consistent with the NHES findings.[15] More importantly, as shown in the results section of this report, the group differences revealed by the parent reports are congruent with findings of previous studies that used other methods, such as direct testing of young children. Despite this encouraging evidence, readers are advised to keep the limitations of parent reports in mind when interpreting the findings.

Organization of the Report

The sections that follow present the findings of the NHES:93 concerning the developmental accomplishments and difficulties of preschoolers. The first section of findings presents data on the status of 3- to 5-year-old preschoolers on the specific developmental measures included in the NHES:93 and the extent to which the selected measures are associated with children's ages. The subsequent sections focus on 4-year-old preschoolers, those who are most likely to have entered kindergarten during the fall term following the survey. Of course, some 4-year-olds, particularly those born in the last quarter of the year, may not have entered kindergarten in 1993. However, the analysis of the accomplishments and difficulties of the 4-year-old preschool population provides the best overview of the status of the population about to enter kindergarten that is available from a cross-sectional methodology. While some 5-year-olds are also preschoolers, particularly those born later in the year, these children have not been included in the analysis of those about to enter kindergarten. The reason for this exclusion is that 5-year-

[15]For example, Ferrara (1987) tested how high a sample of 66 nursery school children (average age 4 years, 6 months) from a small Midwestern city could count by rote, and she found the mean number the children could count to was 30. Parents of 4-year-olds in the NHES reported that 62 percent could count to 20 or higher.

olds not yet in kindergarten may be different from other preschoolers; that is, they may have characteristics that led to a decision by their parents or by a school that the child's entry should occur at a later time. For this reason, their inclusion may introduce a bias into the analysis.

The analyses for 4-year-olds include cross-tabulations of selected child characteristics and sociodemographic risk factors for each of the selected accomplishments and difficulties. The measures are presented in groups that represent specific domains: emerging literacy, small motor skills, speech, and so on. Within each multi-item domain, the mean number of accomplishments and difficulties is also presented. Each of the risk factors is examined in the analysis in terms of its individual relationship with each of the developmental accomplishments and difficulties. In addition, the five risk factors are combined into a total score by adding a 1 for each risk factor the child has. The possible range of this risk index, then, is from 0 (no risk factors) to 5 (all risk factors). For presentation purposes, and owing to the very small number of children with more than three risk factors, categories of risk were created that represent no risk factors, one, two, or three or more risk factors.

In addition, this report describes the results of controlling for variations in demographic composition and for the related influences of other risk factors when examining developmental differences between children from different risk and preschool participation groups. The kinds of questions these results try to answer are: What would developmental differences between poor and non-poor children look like, if both groups had the same average parent education levels, ethnic compositions, age distributions, and so on? Also, what would the differences in accomplishments and difficulties between preschool attendees and nonattendees look like, if we could hold all other factors in the analysis constant?[16]

The report then examines whether a risk index based on the number of risk factors that applied to a given child was as closely related to child development as a composite variable that gave more weight to some individual risk factors than to others. Is there, for example, something special about the relationship between poverty and child development, or are the various risk factors about equal in their detrimental relationships to children's accomplishments and difficulties? Again, these comparisons were made with all other differences between the risk groups held constant.

[16]Multiple linear regression was the statistical procedure used to control for compositional differences and the effects of other factors.

Findings

Before presenting survey findings on the frequencies with which the selected accomplishments and difficulties were reported for various groups of preschool children, the following section presents information about the extent to which the various developmental items go together. An important question about parents' reports of children's accomplishments and difficulties is whether these reports can legitimately be used to form clusters or scales, as child developmentalists would expect.[17] If a given group of items correlate with one another in expected ways, then we are justified in summing the number of positive (or negative) items acknowledged by parents into a summary accomplishment (or difficulty) score. If significant correlations between items are not found, or if the patterns are different from what one would expect from the developmental literature, then the formation of summary scores is not justified.

Covariation and Clustering of the Items

When correlations between the selected accomplishment and difficulty items were analyzed, the items were found to form five dimensions or clusters. Four of these groupings were readily identifiable, corresponding closely with how the items would be expected to cluster, based on prior experience with such measures. A fifth cluster was less readily interpretable, and so was not used in the present analysis. However, the general health status rating, one of the items making up the fifth cluster, was used as a single-item indicator of child health problems.[18]

The four identifiable clusters were

- An *emerging literacy-numeracy* cluster, consisting of five items (identifying primary colors by name, telling connected stories when pretending to read, counting to 20 or more, writing one's own name, and recognizing most or all letters of the alphabet);
- A *small motor* cluster, consisting of three items (holding a pencil properly, buttoning own clothes, and writing or drawing rather than scribbling);[19]

[17]The statistical procedure used to evaluate the dimensions or clusters that the parent responses formed was principal components analysis, a form of factor analysis.

[18]In addition to the general health rating, the fifth cluster included two items on children's vision and hearing difficulties and one social-emotional item, namely, whether the child could be left with a babysitter without making a big fuss. These three individual items were also dropped from the present analysis.

[19]The last item also correlated with the emerging literacy cluster, but was used only with the small motor cluster in the present analysis.

- A *physical activity-attention* cluster, consisting of three social-emotional items (restless/fidgets, short attention span, and frequent temper tantrums) and one gross motor item (trips or falls easily); and

- A *speech problems* cluster, consisting of three items (started speaking late, not understandable to a stranger, and stutters or stammers).

Composite scores were developed for each of the domains by adding up the number of items in the domain that were said to apply to each child. Thus, scores could range from 0–3, 4, or 5, depending on the number of items in the cluster. For the emerging literacy and small motor scales, higher scores meant that the child had more accomplishments, whereas for the physical activity-attention and speech problems scales, higher scores meant that the child had more difficulties. The general health item was dichotomized, with children rated in excellent or very good health assigned a score of 1, while those in good, fair, or poor health were given a score of 2.

Accomplishments and Difficulties of Preschoolers by Age

While children develop at their own paces, there is a general age progression in developmental accomplishments and difficulties. In general, the accomplishments included in this research will eventually be achieved by nearly all children, and many of the difficulties will diminish with age and maturity for most children. Tables 1 and 2 show the prevalence of the selected measures for all 3- to 5-year-old preschoolers and for each age. Because the majority of 5-year-olds are enrolled in kindergarten, the preschool population includes only about one-quarter of all 5-year-olds.

Accomplishments and Health Status

Preschoolers show increasing acquisition of each of the *literacy-numeracy* accomplishments included in this study as they grow older (table 1).[20] However, the extent of change by age varies across the different accomplishments. The percentage of preschoolers who can identify four primary colors increases by 20 percentage points from age 3 to age 5 (from 69 to 89 percent). Much larger increases are observed from age 3 to age 5 in the percentage of children who can recognize most or all letters (from 27 to 66 percent), count to 20 or more (from 37 to 78 percent), and write their names, even if some letters are backwards (from 22 to 84 percent).

About two-thirds of 3-year-old preschoolers read or tell connected stories while pretending to read. This increases to 73 percent at age 4 and 79 percent at age 5. Of course, most preschoolers are pretending to read rather than actually reading. Parents report that, among preschoolers, 2 percent of 3-year-olds, 4 percent of 4-year-olds, and 9 percent of 5-year-olds actually read stories themselves, that is, read the words rather than pretending to read (not shown in tables).

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[20]All statements of differences in the text are significant at the .05 level.

Table 1.— Percentage of 3- to 5-year-old preschoolers with reported developmental accomplishments,[1] by child's age: 1993

Characteristic	All preschoolers		3-year-olds		4-year-olds		5-year-olds	
	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.
	(In thousands)							
Estimated number of children (thousands)	8,579	42	3,889	8	3,713	16	976	39
Literacy-numeracy indicators	(Percent)							
Identifies primary colors	78	.8	69	1.3	84	1.1	89	1.8
Recognizes most or all letters	44	.7	27	1.3	57	1.2	66	2.7
Counts to 20	52	.8	37	1.3	62	1.3	78	2.4
Pretends to read or reads stories[2]	70	.9	65	1.3	73	1.4	79	2.0
Writes own name, even if some letters are backwards	50	.7	22	1.1	70	1.2	84	2.5
Small motor indicators								
Can button his/her clothes	89	.5	83	.9	93	.6	94	1.6
Holds pencil properly	91	.5	87	1.0	94	.6	94	1.5
Writes/draws rather than scribbles	66	.8	50	1.3	78	1.0	84	1.7
Health status								
Excellent, very good	88	.7	88	.8	88	1.0	87	1.6
Good, fair or poor	12	.7	12	.8	12	1.0	13	1.6

[1] As reported by parents.

[2] Includes telling connected stories when pretending to read and reading actual words.

NOTE: s.e. is standard error. Preschoolers are 3- to 5-year-olds who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

The great majority of 3-year-olds can button their clothes (83 percent) and hold a pencil properly (87 percent), two of the three *small motor* accomplishments. The percentage of children who can do these things increases from age 3 to age 4, but not from age 4 to age 5. About half of 3-year-olds can write or draw rather than scribble (50 percent), and by age 5, this has increased substantially to 84 percent.

It is interesting to note that, in the other analyses conducted for this report, month of birth within the age-4 group was also associated with literacy-numeracy accomplishments (see table 8). This suggests that the percentage of children entering kindergarten with these specific skills may be higher than is represented at the time of the spring data collection in the NHES.[21]

The percentage of preschoolers whose general *health status* is reported as excellent or very good remains stable across ages 3 through 5.

[21] Most of the 4-year-olds in the survey would be expected to enter kindergarten in the fall.

Difficulties

About one-quarter of all preschoolers are reported to be restless and fidget a lot, have temper tantrums, and have short attention spans, indicators of *physical activity-attention* difficulties (table 2). There is a modest decline from age 3 to 5 in the percentage of children who are restless and fidget, and a somewhat greater decline in the percentage of children who have temper tantrums. The percentage of preschoolers with short attention spans or who trip or fall easily does not change significantly across these ages.

About one in six preschoolers (16 percent) was reported as starting to speak late. The relationship of this measure to age is not statistically significant, and there is no theoretical reason to expect differences.[22]

Table 2.— Percentage of 3- to 5-year-old preschoolers with reported developmental difficulties,[1] by child's age: 1993

Characteristic	All preschoolers		3-year-olds		4-year-olds		5-year-olds	
	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.	Estimate	s.e.
	(In thousands)							
Estimated number of children (thousands)	8,579	42	3,889	8	3,713	16	976	39
Physical activity-attention indicators	(Percent)							
Is restless, fidgets a lot	27	.7	27	1.2	29	1.1	22	1.9
Has short attention span	24	.8	25	1.2	23	1.1	21	1.7
Has temper tantrums	25	.8	29	1.4	23	1.2	17	2.0
Trips or falls easily	13	.6	13	.9	13	.8	12	1.8
Speech development indicators								
Started speaking late	16	.6	18	1.0	15	.9	15	2.1
Not understandable to a stranger	9	.6	11	1.0	8	.8	9	1.7
Stutters or stammers	8	.5	9	.8	7	.7	9	1.6

[1] As reported by parents.

NOTE: s.e. is standard error. Preschoolers are 3- to 5-year-olds who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Other *speech indicators* relate to the child's current speech difficulties. Of course, it is the children's speech facility or difficulty at the time of kindergarten entry that is most germane to their ability to communicate their needs or thoughts. About 9 percent of respondents reported that their preschooler's speech was not understandable to strangers, and this percentage is fairly similar for 3-, 4-,

[22] The small differences in responses between parents of 3-year-olds and 4- or 5-year-olds may be a function of respondent recall, since the reported percentage declines slightly—but not significantly—as children's ages are further removed from the time when they would have started speaking.

and 5-year-old preschoolers. The percentage of preschoolers who stutter or stammer (8 percent) also does not change significantly across these ages.

Summary

For the most part, the developmental accomplishments addressed in this report are associated with the age of the child and are acquired by children as they grow older. A majority of preschoolers demonstrate the accomplishments by age 4, and large majorities (more than three-quarters) acquire the accomplishments by age 5.

The developmental difficulties examined here are exhibited by about one-twelfth to one-quarter of all preschoolers. Unlike the temporal changes observed for accomplishments, some of the developmental difficulties do not change from ages 3 to 5. Where differences are observed by age, they are not large. It may be that a broader age range would show a decline in the prevalence of some of these difficulties; that information is not available in the data set upon which this report is based.

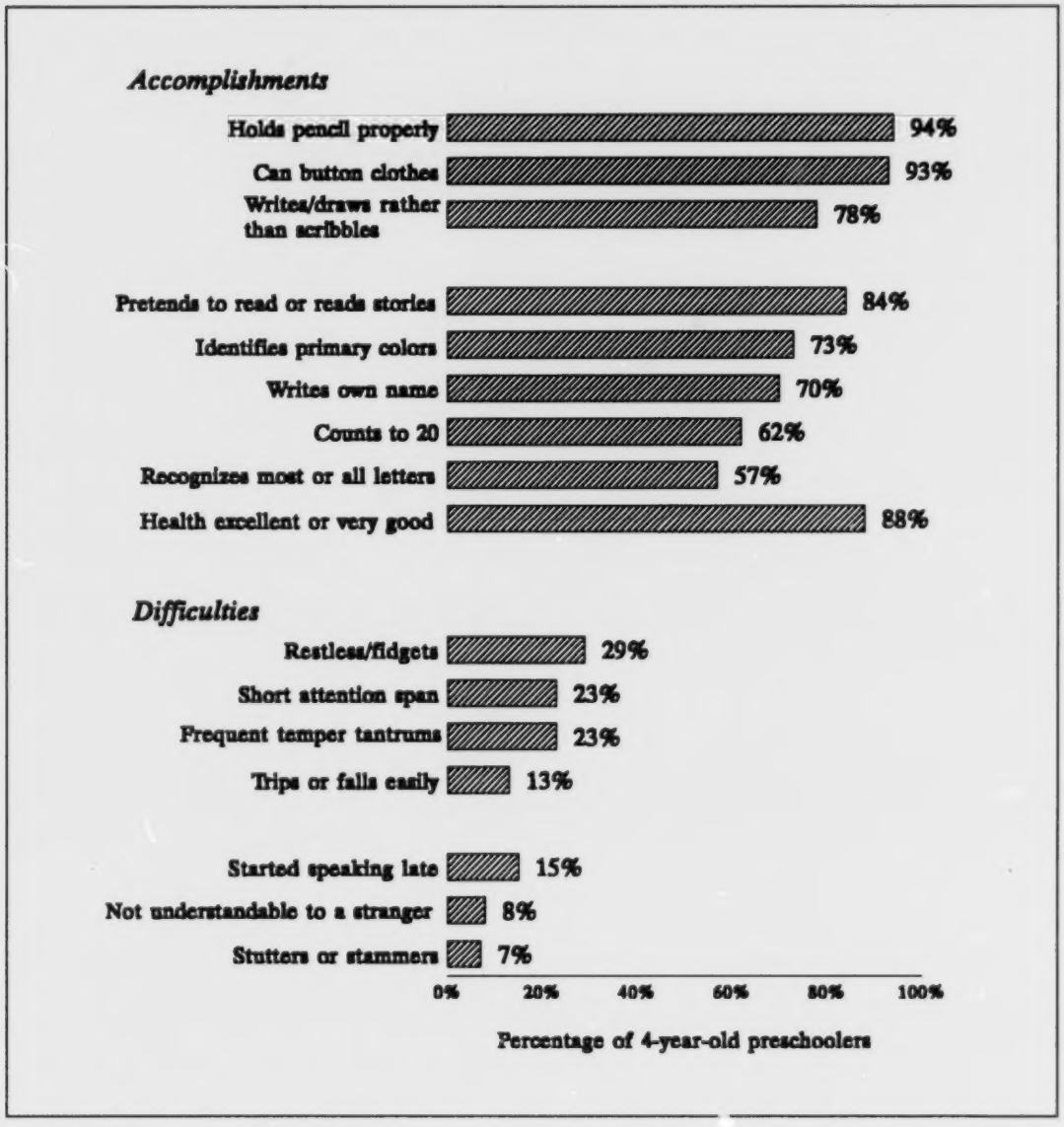
Accomplishments and Difficulties of 4-Year-Old Preschoolers

In the next several sections, we discuss the developmental accomplishments and difficulties of 4-year-olds. As discussed in the introduction to this report, these children represent the population about to enter kindergarten. While not all 4-year-olds will have entered kindergarten in the school year following the NHES:93 survey, the majority of these children will have done so. Therefore, their accomplishments and difficulties provide a good indication of the challenges that face teachers and schools in meeting the needs of incoming kindergartners and preparing them for further schooling.

An Overview of 4-Year-Olds' Accomplishments and Difficulties

Figure 2 shows the prevalence of the selected accomplishments and difficulties among 4-year-old preschoolers. Each of the selected accomplishments was reported for a majority of 4-year-olds, and several of them were reported for three-fourths or more of the children. Nearly all of the children can hold a pencil properly and button their clothes (94 and 93 percent, respectively), and 78 percent write or draw rather than scribble. Among the literacy-numeracy indicators, 84 percent of 4-year-olds read or tell connected stories while pretending to read, 73 percent identify primary colors, 70 percent write their own names, 62 percent count to 20 or more, and 57 percent recognize most or all letters. A large majority of 4-year-old preschoolers (88 percent) are reported by their parents to be in excellent or very good health.

Figure 2.— Percentage of 4-year-old preschoolers with reported accomplishments and difficulties:[1] 1993.



[1] As reported by parents.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

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Smaller percentages of the 4-year-olds were reported to have the developmental difficulties studied, but they represent sizable minorities of prospective kindergartners. About one-fourth of the children are reported to have the physical activity-attention indicators of restlessness and fidgeting (29 percent), a short attention span (23 percent), or temper tantrums (23 percent). A smaller percentage (13 percent) trip or fall easily.[23] About one-twelfth of 4-year-olds have current speech difficulties.

How does the prevalence of these accomplishments and difficulties vary among 4-year-olds of different backgrounds? How are child characteristics and risk factors related to the various developmental domains? The sections that follow present each of the developmental domains and their bivariate relationships to selected child characteristics and risk factors.

Emerging Literacy and Numeracy

The majority of prospective kindergartners (4-year-old preschoolers) have demonstrated the literacy and numeracy accomplishments included in the NHES:93. On average, 4-year-olds have demonstrated 3.5 of the 5 accomplishments (table 3). However, the extent to which they have done so is associated with a number of child characteristics and sociodemographic risk factors.

Sex. There are differences between boys and girls in emerging literacy and numeracy; higher percentages of girls have demonstrated each of the accomplishments. The sex differences are not large, however. About 5 to 7 percent more girls than boys identify colors, count to 20 or more, and read or pretend to read. Girls are also more likely to recognize letters and write their own names by a slightly larger margin (about 9 to 11 percentage points). On average, girls demonstrate 3.7 of the five accomplishments, whereas boys demonstrate fewer, 3.3 on average. These findings are consistent with research demonstrating that boys score slightly but significantly lower on four commonly used tests of school readiness (Ellwein et al. 1991).

[23]While the selected items are indicators of physical activity-attention difficulties, readers should not assume that a child who has any of these difficulties has an attention deficit disorder or is hyperactive. It is not intended that these items serve as diagnostic tools for individual children.

Table 3.— Percentage of 4-year-old preschoolers with reported signs of emerging literacy and numeracy[1] and average number of these accomplishments reported, by child and family characteristics: 1993

Characteristic	Estimated number of children (thousands)	Identifies primary colors		Recognizes most or all letters		Counts to 20		Pretends to read or reads stories		Writes own name		Mean number of accomp's	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Mean	s.e.
Total	3 713	84	1.1	57	1.2	62	1.3	73	1.4	70	1.2	3.5	.04
Child's sex													
Male	1,954	82	1.4	52	1.8	59	2.0	70	1.7	66	1.7	3.3	.06
Female	1,760	87	1.4	63	1.6	66	1.9	76	1.8	75	1.6	3.7	.06
Child's race/ethnicity													
White, non-Hispanic	2,507	91	.9	61	1.4	66	1.4	77	1.4	74	1.4	3.7	.04
Black, non-Hispanic	572	73	3.0	58	3.3	67	3.0	65	2.7	63	3.4	3.3	.10
Hispanic	480	61	3.4	31	3.3	39	3.6	58	3.6	59	3.6	2.5	.12
Other races	154	85	4.4	70	5.4	60	5.3	74	4.8	79	4.4	3.7	.15
Parents in household													
Two parents	2,678	88	1.1	59	1.5	63	1.7	76	1.4	72	1.3	3.6	.05
Other	1,035	75	2.2	53	2.5	59	2.7	65	2.2	66	2.8	3.2	.07
Mother married at child's birth													
Yes	2,781	87	1.1	59	1.5	64	1.5	75	1.5	73	1.2	3.6	.05
No	932	74	2.6	52	2.8	56	2.6	67	2.9	62	3.2	3.1	.09
Mother's primary language[2]													
English	3,412	87	1.1	60	1.2	65	1.4	74	1.4	72	1.3	3.6	.04
Other language	302	55	4.3	25	3.8	28	4.1	54	4.6	54	4.4	2.2	.15
Mother's highest education[2]													
Less than high school	470	56	3.6	33	3.5	36	3.5	55	4.3	51	3.1	2.3	.09
High school diploma or higher	3,243	88	1.1	61	1.3	66	1.5	75	1.3	73	1.2	3.6	.05
Poverty Status													
Poor	994	69	2.8	43	2.7	48	2.8	63	3.1	54	2.7	2.8	.10
Non-Poor	2,720	90	1.0	62	1.2	68	1.4	76	1.3	76	1.2	3.7	.04
Risk factors[3]													
None	1,813	93	1.0	66	1.4	71	1.7	78	1.4	78	1.4	3.9	.05
One factor	757	87	2.1	54	2.8	60	2.4	75	2.8	72	2.3	3.5	.08
Two factors	603	76	3.3	49	3.9	56	3.4	71	3.1	61	3.3	3.1	.12
Three or more factors	539	59	3.4	40	3.4	43	3.3	53	3.8	53	3.6	2.5	.11
Child ever attended center-based program													
Yes	2,718	89	1.0	63	1.3	69	1.4	77	1.4	77	1.3	3.7	.04
No	995	71	2.5	41	2.5	44	2.9	62	2.7	53	2.5	2.7	.09

[1] As reported by parents.

[2] If the mother or female guardian is not a member of the household, the father or male guardian's education or primary language is given.

[3] Risk factors include single parenthood, unmarried motherhood, minority-language status, low maternal education, and poverty.

NOTE: s.e. is standard error. Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Race and Ethnicity. Differences in literacy-numeracy accomplishments by race and Hispanic origin are also observed. Black and white children are similar in the extent to which they recognize letters and count to 20. However, black children are less likely than white children to identify primary colors, read or pretend to read, or write their own names. Hispanic children are less likely than white children to demonstrate each of the literacy-numeracy accomplishments. Differences between white and Hispanic children are particularly large—at or near 30 percentage points—for identifying colors, recognizing letters, and counting to 20. Hispanic children also are less likely than black children to identify colors, recognize letters, or count to 20. The relatively low percentages of Hispanic children who demonstrate some of these accomplishments may be associated with the minority-language status of their mothers, discussed later in this section.[24]

Among racial and ethnic groups, white children demonstrate more of the literacy-numeracy accomplishments (3.7 of the 5), followed by black children (3.3), and Hispanic children (2.5). However, being of Hispanic heritage makes less difference and being black or of another race other than white is not significant when other factors (e.g., risk factors) are accounted for in multivariate analyses (table 8, discussed below).

Sociodemographic Risk Factors. As discussed in an earlier section of this report (see page 6), several sociodemographic risk factors were selected for this analysis. These include family factors (parents in the household, mother's marital status at the time of the child's birth, and the mother's primary language) and socioeconomic factors (maternal education and poverty status). While all of the individual risk factors are not significantly related to all of the literacy-numeracy indicators, each factor and the cumulative number of risks are significantly related to the number of literacy-numeracy accomplishments.

Those children who live with two parents are more likely to identify primary colors and read or pretend to read than children who live in single-parent or other households.[25] Children in two-parent households also demonstrate more accomplishments (3.6, on average) than children in other households (3.2).

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[24]Interviews were conducted in both English and Spanish. Parents were not asked whether children had demonstrated their knowledge of colors, letters, and so on in English.

[25] Children who live in circumstances other than two-parent families are grouped together. Two-parent families may include birth, adoptive, or step-parents. Other households may include single-parent families, grandparents raising their grandchildren, and so on.

Preschoolers whose mothers were married at the time the child was born are more likely to identify colors, recognize most or all letters, count to 20, read or pretend to read, and write their own names. Children of mothers who were married when the child was born also demonstrate more literacy-numeracy accomplishments (3.6, on average) than other 4-year-olds (3.1).

Children of non-English-speaking mothers (72 percent of whom were Hispanic) are far less likely to demonstrate each of the accomplishments than children of English-speaking mothers, and many of the differences are substantial. For example, 87 percent of 4-year-olds of English-speaking mothers identify primary colors, whereas only 55 percent of others do so. Nearly three-fourths of 4-year-olds of English-speaking mothers write their own names, compared with only 54 percent of 4-year-old children of language minority mothers.[26] The difference in the average number of accomplishments is also substantial: 3.6 for children of English-speaking mothers versus 2.2 for other children.

The level of maternal education is strongly related to each of the literacy-numeracy accomplishments. Differences of 20 to 32 percentage points are observed in the percentages of children who have demonstrated each of the accomplishments. Slightly more than half of children whose mothers did not finish high school identify primary colors, read or pretend to read, or write their names, and about one-third recognize most or all letters or count to 20 or more. In contrast, 61 to 88 percent of 4-year-old preschoolers whose mothers finished high school or more education have acquired these accomplishments. The difference in the average number of accomplishments is significant: 2.3 for children whose mothers did not complete high school or an equivalency certificate compared with 3.6 for children whose mothers completed high school.

Four-year-olds living in poverty[27] are less likely than other children to demonstrate each of the literacy-numeracy accomplishments. As differences associated with maternal education and maternal language status are significant, so are differences between children who are poor those who are not, ranging from 13 percentage points (for reading or pretending to read) to 22 percentage points (for writing one's own name). Whereas two-thirds of children who are not poor could count to 20 or more, less than half of the poor children could do so. Although 62 percent of 4-year-olds who are not poor could recognize most letters, 43 percent of the poor could. In addition, poor children demonstrate fewer of the accomplishments (2.8 of the five measures, on average) compared with other children (3.7).

Cumulative Risk Factors. Slightly more than half of 4-year-old preschoolers have at least one of the five risk factors, namely, coming from a family whose income is below the poverty level, having parents who have not completed high school, having been born to an unmarried mother, living in a single-parent family, or having a mother who speaks a language other than English at home. About 20

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[26]Interviews were conducted in English and Spanish for the NHES:93. Those children residing in households in which no parent or guardian spoke English or Spanish well enough to complete the interview could not be included in this study.

[27]See the methodology section of this report for a discussion of the poverty measure.

percent have one risk factor, about 16 percent have two risk factors, and about 15 percent have three or more.[28] The cumulative risk index is related to each of the five literacy-numeracy accomplishments. Children with none of the risk factors are more likely to demonstrate each of the literacy-numeracy accomplishments than are children with one or more of the risk factors. Children with three or more risk factors show about two-thirds the number of literacy-numeracy accomplishments (2.5, on average) of children with no risk factors (3.9). These findings are consistent with research demonstrating a linear relationship between the numbers of risk factors children experience and their verbal IQ scores and social adjustment (cf. Sameroff et al. 1987).

Center-Based Program Participation. Four-year-old preschoolers who have attended center-based early childhood programs (Head Start programs, nursery schools, preschools, prekindergartens, or day care centers) are more likely to exhibit each of the literacy-numeracy accomplishments than those who have not attended such programs. Some of the differences are fairly large. For example, while 89 percent of 4-year-olds who had ever attended a center-based program could identify the primary colors, this was true for only 71 percent of those who had not attended center-based programs. Differences ranging from 15 to 25 percentage points are observed for other accomplishments. In addition, those who had attended centers had exhibited, on average, 3.7 of the five literacy-numeracy accomplishments studied, compared with an average of 2.7 among other 4-year-olds.

Small Motor Accomplishments

Small motor skills are essential to the accomplishment of academic and preacademic tasks such as using pencils and writing one's own name, and are important aspects of self-maintenance capabilities (e.g., buttoning clothes) that children are expected to acquire as they grow older. Compared to the literacy-numeracy domain, the relationships of child characteristics and risk factors to the small motor accomplishments is less uniform. There is little notable variation across groups in the skills of using a pencil or buttoning clothes. At-risk children are not consistently behind in these skills, nor are not-at-risk children consistently ahead. Nearly all 4-year-olds can do these things. On the other hand, findings for writing or drawing rather than scribbling are more similar to the pattern of variation seen with indicators in the literacy-numeracy domain. The mean number of small motor accomplishments that children demonstrate is significantly related to some child characteristics and risk factors, but the differences are extremely small; the reader will note that the means are all within 0.2 of one another (table 4).

Sex. As was observed in the previous section on literacy-numeracy accomplishments, girls have a small advantage over boys in the acquisition of small motor skills (table 4). The 4-year-old girls are more likely than boys to be able to button their clothes, hold a pencil properly, and write or draw rather than scribble. The mean number of accomplishments, that is, the number of these three skills that

[28]The percentage of children with more than three risk factors was relatively small. As a result, values of 3, 4, and 5 were combined for presentation.

children have demonstrated, on average, is slightly but significantly higher for girls than for boys (2.6 versus 2.7).

Race and Ethnicity. The differences by race and Hispanic origin that were observed for literacy-numeracy accomplishments are not observed, in general, for the selected small motor skills. Black children are slightly more likely than white children to be able to button their clothes, but are very similar to white children in the percentages that hold a pencil properly or write or draw rather than scribble. Hispanic children are similar to white children in their ability to button their clothes, and are similar to both white and black children in their ability to hold a pencil. Hispanic children are, however, less likely to write or draw rather than scribble. The mean number of small motor accomplishments was the same for white and black 4-year-olds, 2.7 out of 3. The mean for Hispanics was slightly but significantly less (2.5). In multivariate analyses, the effects of race and Hispanic origin were no longer statistically significant when the risk factors were introduced into the models (table 8, discussed below).

Table 4.— Percentage of 4-year-old preschoolers with reported small motor accomplishments[1] and average number of accomplishments reported, by child and family characteristics: 1993

Characteristic	Estimated number of children (thousands)	Can button clothes		Holds pencil properly		Writes/draws rather than scribble		Mean number of accomplishments	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Mean	s.e.
Total	3,713	93	.6	94	.6	78	1.0	2.7	.02
Child's sex									
Male	1,954	91	.9	92	.9	74	1.6	2.6	.02
Female	1,760	96	.8	96	.7	82	1.4	2.7	.02
Child's race/ethnicity									
White, non-Hispanic	2,507	92	.8	93	.7	79	1.3	2.7	.02
Black, non-Hispanic	572	97	.8	96	1.2	79	3.0	2.7	.03
Hispanic	480	94	1.4	94	1.6	67	2.9	2.5	.04
Other races	154	90	4.0	92	3.2	86	4.7	2.7	.09
Parents in household									
Two parents	2,678	93	.8	94	.6	79	1.1	2.7	.02
Other	1,035	94	.9	92	1.6	76	2.7	2.6	.04
Mother married at child's birth									
Yes	2,781	93	.7	93	.7	78	1.1	2.6	.02
No	932	94	1.2	95	1.1	77	2.4	2.7	.03
Mother's primary language[2]									
English	3,412	93	.6	94	.6	79	1.1	2.7	.02
Other language	302	93	2.0	95	1.8	67	4.1	2.5	.05
Mother's highest education[2]									
Less than high school	470	95	1.4	95	1.3	71	3.6	2.6	.04
High school diploma or higher	3,243	93	.6	94	.6	79	1.0	2.7	.02
Poverty Status									
Poor	994	95	1.1	94	1.2	72	2.4	2.6	.03
Non-Poor	2,720	92	.7	94	.6	80	1.1	2.7	.02
Risk factors[3]									
None	1,813	92	.9	94	.8	81	1.3	2.7	.02
One factor	757	94	1.5	94	1.1	79	3.0	2.7	.04
Two factors	603	94	1.5	93	1.8	71	2.8	2.6	.04
Three or more factors	539	95	1.5	95	1.4	74	3.3	2.7	.04
Child ever attended center-based program									
Yes	2,718	93	.7	94	.6	80	1.4	2.7	.02
No	995	94	1.1	93	1.1	71	2.4	2.6	.03

[1] As reported by parents.

[2] If the mother or female guardian is not a member of the household, the father or male guardian's education or primary language is given.

[3] Risk factors include single parenthood, unmarried motherhood, minority-language status, low maternal education, and poverty.

NOTE: s.e. is standard error. Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Sociodemographic Risk Factors. The selected risk factors, many of which were associated with each of the literacy-numeracy accomplishments, show a very different pattern of association with the small motor skills (table 4). None of the risk factors is significantly associated with the 4-year-olds' abilities to hold a pencil. Although parents in the household, poverty status, and cumulative risk factors are associated with children's ability to button their clothes, differences are small.

The relationships of some of the risk factors to the 4-year-olds' ability to write or draw rather than scribble are similar to those observed for the literacy-numeracy indicators. Specifically, children whose mothers' primary language is not English, whose mothers did not finish high school, and who are poor are less likely to write or draw. However, the mother's marital status at the time of the child's birth and the number of parents who live in the household are not associated with the 4-year-olds' ability to write or draw. The cumulative number of risk factors is also associated with the ability to write or draw. While the percentage of children who can do so is lower for children with two risk factors than for children with no risk factors, the percentage does not decline significantly as the number of risk factors increases.

Center-Based Program Participation. The child's attendance at a center-based program is not related to a child's ability to button his/her clothes or hold a pencil properly. This may be because more than 80 percent of children are able to do these things at age 3 (see table 1) and, therefore, many may do so before entering a center-based program. Center-based program participation is positively related to a child's ability to write or draw rather than scribble. Those who have ever attended such a program are more likely to write or draw (80 percent compared with 71 percent).

The differences in the relationships of the selected risk factors and center-based program participation to the child's ability to write or draw may reflect a close relationship of this measure to the literacy-numeracy dimension. While writing or drawing rather than scribbling is a measure of fine motor control and does not have a specific content dimension (e.g., spelling words), this skill is associated to some degree with emerging literacy and is associated with perceptual development. In the analysis of the correlations among the accomplishments and difficulties items, the ability to write or draw correlates significantly with both those items in the small motor cluster and those in the literacy-numeracy cluster (not shown in tables).

Physical Activity-Attention Indicators

Four indicators of physical activity-attention difficulties are included in this analysis: the child being restless or fidgeting, having a short attention span, having frequent temper tantrums, and tripping or falling easily. These measures represent "behavioral dimensions that are important to adaptation to society and to school (Pellegrini and Horvat 1995)." Each of these characteristics are reported to apply to only a minority of children, with the most common (restlessness) applying to less than 30 percent of

the 4-year-old preschoolers. The average 4-year-old is said to have none of the characteristics. In general, these indicators are related to sex and several of the selected measures of risk (table 5).

Sex. Boys are more likely than girls to be restless or fidget, to have short attention spans, and to trip or fall easily. There is no difference between boys and girls in having temper tantrums. On average, boys exhibit one (1.0) of these four characteristics; for girls, the average is slightly less (.8).[29] These findings are consistent with extant research indicating that boys tend to be overrepresented among children diagnosed as having behavioral problems in general and the attention deficit-hyperactivity disorder in particular (Achenbach 1982; Rutter, Tizard, and Whitmore 1970; Sattler 1992).

Race and Ethnicity. According to their parents, Hispanic children are considerably more likely than either white or black children to exhibit restlessness or fidgeting, a short attention span, and temper tantrums. Race is not associated with the child's tendency to trip or fall easily; however, Hispanic children are more likely than non-Hispanic white children to have this difficulty. On average, Hispanic children exhibit 1.4 of these difficulties, compared to just under 1 among white and black children (.8 and .9, respectively). When risk factors are included in multivariate analyses, sex and Hispanic origin are found to be associated with physical activity-attention difficulties; boys are more likely to demonstrate the physical activity-attention difficulties than girls, and Hispanic children are more likely to demonstrate them than non-Hispanic children. Race is not a predictor of the physical activity-attention score, when the risk factors are controlled (see table 8, discussed below).

[29]Note that the cumulative number in this domain refers to the number of difficulties that were reported out of the group of four.

Table 5.— Percentage of 4-year-old preschoolers with reported physical activity-attention difficulties[1] and average number of these difficulties reported, by child and family characteristics: 1993

Characteristic	Estimated number of children (thousands)	Restless/fidgets		Short attention span		Has temper tantrums		Trips or falls easily		Mean no. of difficulties	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Mean	s.e.
Total	3,713	29	1.1	23	1.1	23	1.2	13	.8	.9	.03
Child's sex											
Male	1,954	34	1.8	26	1.7	24	1.5	14	1.2	1.0	.05
Female	1,760	23	1.5	20	1.3	22	1.6	11	.9	.8	.03
Child's race/ethnicity											
White, non-Hispanic	2,507	25	1.2	20	1.2	20	1.3	11	.9	.8	.03
Black, non-Hispanic	572	31	3.5	24	3.3	24	2.6	15	2.6	.9	.08
Hispanic	480	45	3.4	41	3.5	37	3.5	18	2.4	1.4	.09
Other races	154	30	5.9	21	5.6	25	5.2	19	5.7	1.0	.15
Parents in household											
Two parents	2,678	27	1.1	20	1.1	20	1.2	11	.9	.8	.03
Other	1,035	35	2.7	30	2.5	32	2.6	17	1.8	1.1	.07
Mother married at child's birth											
Yes	2,781	26	1.2	21	1.2	20	1.2	11	1.0	.8	.03
No	932	37	2.9	30	2.4	31	2.4	19	2.4	1.2	.07
Mother's primary language[2]											
English	3,412	27	1.2	21	1.1	22	1.2	12	.8	.8	.03
Other language	302	50	3.8	43	4.9	35	3.6	18	3.1	1.4	.10
Mother's highest education[2]											
Less than high school	470	43	3.8	38	4.0	36	3.8	19	3.3	1.4	.11
High school diploma or higher	3,243	27	1.2	21	1.0	21	1.2	12	.9	.8	.03
Poverty Status											
Poor	994	36	3.2	32	3.1	28	2.8	18	2.0	1.1	.08
Non-Poor	2,720	26	1.0	20	1.0	21	1.2	11	.9	.8	.03
Risk factors[3]											
None	1,813	22	1.4	17	1.1	17	1.3	9	1.1	.7	.03
One factor	757	29	2.7	20	2.1	23	2.3	11	1.6	.8	.05
Two factors	603	36	3.2	33	3.6	33	3.5	17	2.4	1.2	.09
Three or more factors	539	41	4.2	37	3.8	32	3.5	21	3.1	1.3	.11
Child ever attended center-based program											
Yes	2,718	28	1.3	23	1.1	23	1.4	14	1.1	.9	.03
No	995	31	2.1	25	2.0	23	2.2	10	1.5	.9	.05

[1] As reported by parents.

[2] If the mother or female guardian is not a member of the household, the father or male guardian's education or primary language is given.

[3] Risk factors include single parenthood, unmarried motherhood, minority-language status, low maternal education, and poverty.

NOTE: s.e. is standard error. Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Sociodemographic Risk Factors. In general, each of the selected risk factors is associated with each of the physical activity-attention indicators. Four-year-old preschoolers who live in two-parent households, whose mothers were married when they were born, whose mothers speak English in the home, whose mothers completed high school, and who are not poor are less likely to exhibit each of the difficulties.[30] For example, more than a third of poor preschoolers are reported to be very restless and nearly a third are reported to have short attention spans. By contrast, about one-quarter of children who are not poor are said to be very restless, and one-fifth to have short attention spans. Also, the average number of difficulties is greater for at-risk children for each of the individual risk measures.

The cumulative number of risk factors is also associated with each of the physical activity-attention indicators. Those 4-year-olds who have none of the selected risk factors are less likely than those with risk factors to exhibit each of these difficulties. In addition, the percentage of children demonstrating these difficulties is greater among children with higher numbers of risk factors.

Center-Based Program Participation. None of the four measures of physical activity-attention difficulties are associated with participation in center-based programs.

Speech Development

Three measures of speech development difficulty are included in this analysis: starting to speak late, not being understandable to a stranger, and stuttering or stammering. Each of these speech problems is relatively rare, with the most common (starting to speak late) applying to 15 percent of 4-year-old preschoolers. The average number of speech difficulties reported per child is well under one (mean = 0.3). The relationships between these speech indicators and the child characteristics and risk factors are mixed. That is, while few child and family characteristics are associated with speaking late, sex and some risk factors are associated with a child's speech being understandable, and additional characteristics are associated with stuttering and stammering (table 6).

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[30]There is an exception, however, concerning tripping and falling—children whose mothers have minority-language status are not significantly more likely to trip or fall.

Table 6.— Percentage of 4-year-old preschoolers with reported speech development indicators[1] and average number of speech difficulties reported, by child and family characteristics: 1993

Characteristic	Estimated number of children (thousands)	Started speaking late		Not understandable to a stranger		Stutters or stammers		Mean no. of difficulties	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Mean	s.e.
Total	3,713	15	.9	8	.8	7	.7	.3	.02
Child's sex									
Male	1,954	20	1.3	9	.9	9	1.2	.4	.02
Female	1,760	10	1.2	6	1.0	5	.8	.2	.02
Child's race/ethnicity									
White, non-Hispanic	2,507	14	1.1	6	.9	5	.7	.3	.02
Black, non-Hispanic	572	13	1.8	11	2.7	11	2.5	.4	.04
Hispanic	480	17	2.5	8	1.6	13	2.1	.4	.04
Other races	154	31	7.1	14	4.5	8	3.1	.5	.11
Parents in household									
Two parents	2,678	15	1.0	7	.7	6	.7	.3	.02
Other	1,035	15	1.9	10	1.6	10	1.6	.3	.04
Mother married at child's birth									
Yes	2,781	15	.9	7	.8	6	.7	.3	.02
No	932	15	1.9	10	1.7	11	1.6	.4	.03
Mother's primary language[2]									
English	3,412	15	.9	8	.8	7	.7	.3	.02
Other language	302	21	3.3	7	1.9	16	3.2	.4	.06
Mother's highest education[2]									
Less than high school	470	14	2.5	16	2.9	15	2.3	.5	.05
High school diploma or higher	3,243	15	1.0	6	.8	6	.7	.3	.02
Poverty Status									
Poor	994	16	2.1	12	2.0	11	1.6	.4	.04
Non-Poor	2,720	15	1.0	6	.7	6	.7	.3	.02
Risk factors[3]									
None	1,813	15	1.2	5	.8	5	.7	.2	.02
One factor	757	16	2.1	7	1.3	6	1.2	.3	.03
Two factors	603	13	2.2	11	2.6	9	1.8	.3	.05
Three or more factors	539	17	2.6	14	2.4	16	2.6	.5	.05
Child ever attended center-based program									
Yes	2,718	16	1.1	8	.8	7	.9	.3	.02
No	995	14	1.6	8	1.3	9	1.2	.3	.02

[1] As reported by parents.

[2] If the mother or female guardian is not a member of the household, the father or male guardian's education or primary language is given.

[3] Risk factors include single parenthood, unmarried motherhood, minority-language status, low maternal education, and poverty.

NOTE: s.e. is standard error. Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Sex. Males are about twice as likely as females to have started speaking late (20 percent compared with 10 percent). Sex is also associated with a child's being understandable to a stranger and stuttering or stammering, although the differences are not large. The average number of speech difficulties is larger for boys (.4 of the three) than for girls (.2).

Race and Ethnicity. Race and Hispanic origin are not associated with whether a child started speaking late or whether a child is understandable to a stranger. Race and Hispanic origin are related to whether a child stutters or stammers; white 4-year-olds are less likely to be reported as doing so than black or Hispanic children. The mean number of speech difficulties is very similar for white, black, and Hispanic 4-year-olds (.3, .4, and .4, respectively).

Sociodemographic Risk Factors. Many of the relationships between the sociodemographic risk factors and the selected speech indicators are not statistically significant. However, some of the factors are related to a child's being understandable or a child's stuttering or stammering. Specifically, whether the child's mother finished high school and the family's poverty status are related to a child's being understandable and stuttering or stammering. Twice as many poor 4-year-olds as other 4-year-olds are not understandable to a stranger (12 percent versus 6 percent) or stutter or stammer (11 versus 6 percent). Having a mother with minority-language (i.e., one whose primary language in the home is not English) is related to the child's starting to speak late and to stuttering or stammering.

The cumulative number of risk factors is not associated with whether a child started speaking late, but is related to whether a child's speech is understandable to a stranger and whether he or she stutters or stammers. Children with more risk factors are more likely to have these speech difficulties.

Health Status

Kindergarten teachers overwhelmingly rate being healthy, rested, and well nourished as essential or very important for kindergarten entry (Heaviside and Farris 1993). While not directly comparable with the measure used in the recent survey of kindergarten teachers, the general health status of children as reported in this study is one important indicator of the incoming school population's condition. A substantial majority of parents (88 percent) report that their 4-year-old's health is excellent or very good (table 7). However, variation in health status is observed across the child characteristics and risk factors included in this analysis.

Table 7.— Health status[1] of 4-year-old preschoolers, by child and family characteristics: 1993

Characteristic	Estimated number of children (thousands)	Excellent or very good		Good, fair, poor	
		percent	s.e.	percent	s.e.
Total	3,713	88	1.0	12	1.0
Child's sex					
Male	1,954	87	1.4	13	1.4
Female	1,760	90	1.4	10	1.4
Child's race/ethnicity					
White, non-Hispanic	2,507	93	.9	7	.9
Black, non-Hispanic	572	85	2.4	15	2.4
Hispanic	480	72	3.1	28	3.1
Other races	154	75	5.3	25	5.3
Parents in household					
Two parents	2,678	91	.9	9	.9
Other	1,035	81	2.0	19	2.0
Mother married at child's birth					
Yes	2,781	89	1.0	11	1.0
No	932	85	2.2	15	2.2
Mother's primary language[2]					
English	3,412	90	1.0	10	1.0
Other language	302	66	4.4	34	4.4
Mother's highest education[2]					
Less than high school	470	72	3.1	28	3.1
High school diploma or higher	3,243	91	1.1	9	1.1
Poverty Status					
Poor	994	79	2.3	21	2.3
Non-Poor	2,720	91	1.0	9	1.0
Risk factors[3]					
None	1,813	94	.8	6	.8
One factor	757	90	2.0	10	2.0
Two factors	603	81	2.3	19	2.3
Three or more factors	539	74	3.3	26	3.3
Child ever attended center-based program					
Yes	2,718	89	1.2	11	1.2
No	995	87	1.5	13	1.5

[1] As reported by parents.

[2] If the mother or female guardian is not a member of the household, the father or male guardian's education or primary language is given.

[3] Risk factors include single parenthood, unmarried motherhood, minority-language status, low maternal education, and poverty.

NOTE: s.e. is standard error. Because of rounding, percents may not sum to 100. Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Race and Ethnicity. The health status of white, black, and Hispanic children is different. Parents report 93 percent of white 4-year-olds to be in excellent or very good health. The percentage is lower for black children (85 percent) and lower still for Hispanic children (72 percent). Twice as many black 4-year-olds (15 percent) and four times as many Hispanic 4-year-olds (28 percent) as white children (7 percent) are reported as being in less than very good health. However, as in some other domains, no relationship between race and health status is found for black children after controlling for risk factors (table 8, discussed below).

Sociodemographic Risk Factors. Each of the five sociodemographic risk factors is related to the health status of 4-year-old preschoolers. Children who do not live with two parents, whose mothers did not finish high school, whose families are poor, whose mother's primary language is not English, and whose mothers were not married when the child was born are less likely to be reported as being in excellent or very good health. In fact, poor preschoolers are twice as likely to be in less than very good health when compared with preschoolers who are not poor (21 percent versus 9 percent).

The greatest difference in the percentage of children in excellent or very good health is the difference between children whose mothers' primary language is English and other children. This relationship remains after controlling for other risk factors (see table 8). This may be related to differences in how English speakers and non-English speakers think about or perceive good health. Or it may reflect a lack of access to health care because of minority-language status. In fact, responses to other items in the NHES:93 interview indicate that 10 percent of preschoolers with mothers of minority-language status do not have a regular health care provider for routine care such as checkups or shots, compared with about half as many (5 percent) of the children whose mothers speak English primarily (not shown in tables).

Center-Based Program Participation. No significant relationship is found between attendance at a center-based program and a child's general health status.

Effects of Sociodemographic Risk Factors When Controlling for Other Factors

One of the major questions addressed in this study is whether family risk factors that have been found to be linked to learning difficulties after children start school are also associated with the accomplishments and difficulties that children bring with them when they arrive at kindergarten. As noted earlier, five sociodemographic risk factors were examined: low maternal education (less than a high school education); family poverty status; the mother's minority-language status; the mother being unmarried at the time of the child's birth; and the preschooler currently living with only one parent.

In the foregoing analyses, this research has addressed the accomplishments and difficulties of preschoolers within specific developmental domains and has related them to child characteristics and

sociodemographic risk factors. In this section, the risk factors are assessed in terms of their relationships with developmental indicators *across* domains, both as individual risk factors and as a group.

It is clear that the risk factors are associated with fewer accomplishments and more difficulties in preschoolers who are about to enter kindergarten. The question now is whether these relationships are maintained when related child and family characteristics are controlled. The control variables are: the child's sex; month of birth; race and Hispanic origin; and the number of children under age 9 in the household. If the sociodemographic risk factors are truly important for young children's development, then they should continue to show relationships with the developmental accomplishments and difficulties after these control variables are taken into account.

The next question is whether some family risk factors are more important than others in terms of their relationships with the accomplishments and difficulties of 4-year-old children. If so, which ones? Are some risk factors more important for particular developmental domains, or do they operate similarly across domains? Last, does simply counting up the number of risks a child is subject to provide as strong a relationship with development as procedures that give special weight to particular risks?

Relationships with Risk Factors as a Group

The sociodemographic risk factors as a group (low maternal education, poverty, mother's minority-language status, unmarried mother, and single parenthood) are clearly related to three of the developmental indexes, more ambiguously related to one of the indexes, and not related to the last index (table 8). As evidenced in the increase in variance accounted for by the inclusion of these risk factors, they are related to the emerging literacy-numeracy score, the physical activity-attention score, and the indicator of general health problems. Furthermore, the risk factors operate in the manner anticipated; i.e., the presence of one or more risks is associated with fewer literacy-numeracy accomplishments, more signs of physical activity-attention difficulties, and an increased likelihood that the child is in less than very good health. This remains true when the related child and family characteristics are controlled. The relationship is more marginal in the case of the speech difficulties index. The sociodemographic risk factors are not related to the small motor development scale.

Table 8.— Linear regression models relating developmental accomplishment and difficulty indexes to sociodemographic risk factors and control variables for 4-year-old preschoolers: 1993

Independent variables	Developmental index (dependent variable)									
	Emerging literacy/numeracy		Small motor skills		Physical activity–attention difficulties		Speech difficulties		Health problem	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
Intercept	4.86**	.14	2.82**	.07	.37*	.12	.06	.05	1.06**	.03
Risk factors										
Low maternal education	-.81**	.10	-.03	.04	.30*	.11	.13	.06	.11**	.03
Poverty status	-.52**	.12	-.04	.05	.05	.09	.06	.05	.05	.03
Minority language status	-.83**	.17	-.05	.07	.29†	.12	.05	.09	.13*	.04
Unmarried mother	-.16	.12	.04	.04	.23†	.09	.03	.04	-.04	.02
Single parenthood	-.10	.07	-.06	.04	.23*	.09	-.00	.04	.89**	.02
Controls										
Sex (male child)	-.38**	.08	-.19**	.03	.22**	.06	.16**	.03	.02	.02
Black, non-Hispanic child	.01	.11	.12†	.05	-.11	.09	.02	.05	.02	.03
Hispanic child	-.35†	.13	-.07	.05	.31*	.10	.03	.06	.09*	.03
Other race	.31	.16	.06	.10	.06	.15	.24	.12	.12*	.05
Number of children under age 9 in household	-.14¤	.05	.04	.02	.05	.05	.02	.02	-.01	.01
Month of birth	-.08**	.01	-.02	<.01	.01	.01	.01	<.01	-.00	<.01
Percentage of variance accounted for by model (R^2)	22.3%		4.9%		8.8%		4.3%		9.8%	
F (11, 50)	49.69**		5.94**		10.29**		6.14**		9.06**	
Increase in variance accounted for due to inclusion of risk factors (ΔR^2)	9.2%		0.3%		3.7%		1.0%		4.3%	
F (5, 50)	44.53**		0.88		9.46**		2.92†		8.73**	

B = unstandardized regression coefficients
s.e. = standard errors

** $p < .01$
* $p < .05$
† $p < .10$

NOTE: Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Relationships with Individual Risk Factors

Our analyses shows that some risk factors are more important than others in terms of their relationship with the accomplishments and difficulties of 4-year-olds, but the identity of the related factors varies across the different developmental scales (table 8). With respect to the emerging literacy index, for example, the related factors are minority-language status, low maternal education, and poverty status. With respect to the physical activity-attention scale, the related factors are low maternal education, single parenthood, minority-language status, and unmarried motherhood. However, the statistical reliability of the latter two factors is marginal. With respect to the general health problems indicator, the related factors are single parenthood, minority-language status, and low maternal education.

A different sort of result is obtained for the speech difficulties index. Here, none of the individual risk factors (table 8) has a relationship that is reliably greater than zero, although an index formed by counting the number of risk factors is related to the speech difficulties scale (table 9). In the case of the small motor skills scale, neither any of the individual risk factors nor a count of the number of risks to which the child is subject is related to the scale score.

Thus, across the five developmental domains, the most consistently detrimental factor is low maternal education, which is related to three of the developmental scales: emerging literacy, physical activity-attention difficulties, and health problems. Minority-language status is also related to development in the same three domains, although its reliability is marginal in one of the domains (physical activity-attention difficulties). Single parenthood shows relationships in two domains: physical activity-attention and general health problems. After controlling for other factors, poverty status is related to development in only one domain, emerging literacy. Unmarried motherhood is also significantly related to development in only one domain, physical activity-attention difficulties, and even here its reliability is marginal.

It is important to note that the various risk factors are intercorrelated. For example, a child whose mother had less than a high school education and was a single parent has a higher probability of being in a poverty-level family. Likewise, a mother who was unmarried at the time of the child's birth has a good chance of being a single parent when the child is a 4-year-old.[31] The stronger relationships that low maternal education and single parenthood display might occur because they are root causes of both poverty and impaired child development. On the other hand, the stronger relationships might occur because these related factors are more stable over time or more reliably measured than poverty status or unmarried motherhood.

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[31]Among the 2,000 4-year-old preschoolers in the survey, poverty status correlates $r = .34$ with being in a single-parent family, $r = .32$ with the mother being unmarried at the child's birth, $r = .27$ with having a mother who had not completed high school, and $r = .18$ with having a mother who speaks a language other than English at home. The correlation between the mother being unmarried at the child's birth and the child being in a single-parent family at the time of the survey is $r = .44$.

Relationships with Number of Risks

Does counting up the number of risks to which a child is subject provide as good a relationship with developmental accomplishments and difficulties as analysis procedures that give special weight to particular risk factors? A risk index based on a simple count of the number of risk factors for each child is related to four of the five developmental scales: the emerging literacy scale, the physical activity-attention difficulties scale, the speech difficulties scale, and the health problems indicator (table 9). The relationship remains significant after controlling for the other child and family characteristics discussed above. The risk index is not significantly related to the small motor skills scale. For the physical activity-attention and speech difficulties scales, analyses that use the risk index are just as effective in accounting for variations in the scales as analyses that give special weights to particular risks. On the other hand, for the emerging literacy scale and the health problems indicator, analyses that take account of which individual risk factors are involved account for more variation than analyses that use the risk index.[32] For the small motor skills scales, neither the individual risk factors nor the risk index does much to increase the amount of variation accounted for by the control variables.

Developmental Differences Associated with Participation in Preschool Programs

In previous sections, the associations of developmental accomplishments and difficulties with participation in center-based early childhood programs (such as day care centers, nursery schools, preschools, and Head Start) are discussed for each domain. In this section, the findings *across* domains are considered. The research questions addressed here are:

- Do 4-year-olds who attend preschool programs show more literacy or small motor accomplishments, or fewer physical activity-attention, speech, or health difficulties than 4-year-olds who do not attend preschool?
- Does attending center-based programs make more of a difference in some developmental domains than in others?
- Are there indications that the benefits of preschool programs are greater for at-risk children than for those not at risk?

To answer these questions, a variable was added to the analyses described above that indicates whether or not each 4-year-old was then attending or had attended a center-based preschool or day care program. If program attendance makes a difference, the participation variable should show a positive

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[32]The increase in percent variance accounts for from using individual risk factors instead of the risk index is 3.3% for the emerging literacy index and 1.7% for the health problem indicator. These differences are both statistically significant ($F(4, 50) = 37.9$ and 8.6, respectively, $p < .01$).

Table 9.— Linear regression models relating developmental accomplishment and difficulty indexes to sociodemographic risk index and control variables for 4-year-old preschoolers: 1993

Independent variables	Developmental index (dependent variable)									
	Emerging literacy/numeracy		Small motor skills		Physical activity–attention difficulties		Speech difficulties		Health problem	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
Intercept	4.97**	.13	2.82**	.07	.39**	.12	.04	.06	1.05**	.03
Risk index	-.39**	.04	-.03	.02	.21**	.03	.06*	.02	.05**	.01
Controls										
Sex (male child)	-.37**	.08	-.19**	.03	.22**	.06	.16**	.03	.02	.02
Black, non-Hispanic child	.15	.11	.13*	.05	-.13	.09	-.00	.05	-.00	.03
Hispanic child	-.69**	.12	-.08	.04	.38**	.08	-.05	.05	.14**	.03
Other race	.19	.15	.05	.09	.06	.15	.23	.12	.14*	.05
Number of children under age 9 in household	-.18**	.05	.04	.02	.05	.05	.02	.02	-.00	.01
Month of birth	-.08**	.01	-.02	<.01	.01	.01	.01	<.01	-.00	<.01
Percentage of variance accounted for by model (R^2)	19.0%		4.8%		8.4%		4.1%		8.1%	
F (7, 54)	51.10**		9.48**		13.39**		7.91**		9.22**	
Increase in variance accounted for due to inclusion of risk index (ΔR^2)	5.9%		0.2%		3.3%		0.8%		2.6%	
F (1, 54)	110.52**		2.23		36.30**		10.37**		20.85**	

B = unstandardized regression coefficients
s.e. = standard errors

** $p < .01$
* $p < .05$
† $p < .10$

NOTE: Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

relationship with each of the developmental scales (i.e., it should be associated with more accomplishments or, in the case of the difficulty scales, fewer difficulties). Also, the addition of the participation variable should produce an increase in the amount of variation in each scale that is accounted for, above that accounted for by the risk index and control variables.

The analyses shows that preschool program participation has a clear and substantial effect on the emerging literacy scores of 4-year-old preschoolers: Having attended such a program is associated with a net increase of nearly one full accomplishment (.82) out of the five accomplishments in the scale. The addition of the participation term also results in an increase in the variation in literacy scale scores accounted for in the analysis, over and above that accounted for by the risk index and control variables (table 10).

The results are different for the regression analyses done with the small motor accomplishment count and the three developmental difficulty scales. In none of these other domains does preschool attendance have a relationship with the scale score that is reliably greater than zero, nor does the addition of the participation indicator produce an increase in the amount of variation accounted for.

Another analysis tests whether the benefits of preschool attendance are greater for at-risk children than for other children, i.e., whether there is an interaction between program participation and risk status. No solid evidence of an interaction between a child's risk status and the developmental effects of preschool attendance is found, not even in the literacy-numeracy domain. (Analysis not shown in text tables. See appendix table B-1 and accompanying text.)

In sum, having attended a center-based preschool program is found to produce a reliable increase in a 4-year-old's emerging literacy skills, such as being able to count to 20, recognize letters of the alphabet, or write his or her own name. This is true for children from both high-risk and low-risk backgrounds. On the other hand, preschool participation is not found to reduce the prevalence of behavioral, speech, and health difficulties that are found to be more common among at-risk preschoolers.

Table 10.— Linear regression models relating developmental accomplishment and difficulty indexes to preschool program attendance, sociodemographic risk index and control variables for 4-year-old preschoolers: 1993

Independent variables	Developmental index (dependent variable)									
	Emerging literacy/numeracy		Small motor skills		Physical activity–attention difficulties		Speech difficulties		Health problem	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
Intercept	4.20**	.16	2.76**	.08	.32*	.13	.02	.06	1.05**	.03
Child attended preschool	.82**	.09	.07	.04	.07	.05	.02	.03	.00	.02
Risk index	-.36**	.04	-.02	.02	.21**	.03	.06*	.02	.05**	.01
Controls										
Sex (male child)	-.36**	.08	-.19**	.03	.22**	.06	.16**	.03	.02	.02
Black, non-Hispanic child	.09	.11	.12†	.05	-.13	.09	-.01	.05	-.00	.03
Hispanic child	-.62**	.11	-.07	.04	.38**	.08	.05	.05	.14**	.03
Other race	.16	.15	.05	.09	.07	.15	.23	.12	.14**	.05
Number of children under age 9 in household	-.14†	.05	.04	.02	.04	.05	.02	.02	-.00	.01
Month of birth	-.07**	.01	-.02	<.01	.01	.01	.01	<.01	-.00	<.01
Percentage of variance accounted for by model (R^2)	24.7%		5.0%		8.5%		4.1%		8.1%	
F (8, 53)	57.73**		8.68**		11.75**		6.76**		7.98**	
Increase in variance accounted for due to inclusion of preschool variable (ΔR^2)	5.7%		0.2%		0.1%		<0.1%		0.0%	
F (1, 53)	105.87**		3.32		1.00		0.26		0.03	

B = unstandardized regression coefficients
s.e. = standard errors

** $p < .01$
* $p < .05$
† $p < .10$

NOTE: Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

Summary and Discussion

This report has examined the prevalence of selected accomplishments and difficulties in a national sample of 4,423 children from 3 to 5 years of age who had not yet started kindergarten. The data were collected in January through April 1993 as part of the National Household Education Survey.

The accomplishments consist of signs of emerging literacy and numeracy and small motor skills. The difficulties encompass behavioral signs of physical activity-attention difficulties, speech difficulties, and less than optimal health. The determination of whether the child displays each of these accomplishments and difficulties is based on reports from one of the child's parents, usually the mother. The accomplishments and difficulties reported in this study include some behaviors that can be observed and reported objectively—e.g., whether a child buttons his or her clothes, counts to 20, or identifies primary colors. Other measures, many of them difficulties, require assessments of the child's behavior against criteria that are not explicitly described and are not universally agreed upon. These include, for example, measures associated with temper tantrums, attention span, or a child's speech being understandable. Parents from different backgrounds may hold different expectations in regard to these criteria and may assess their children's behavior differently as a result.

This analysis has focused especially on children who had turned 4 by the end of the previous calendar year and were about 6 months away from starting kindergarten at the time of the survey. A majority of these 4-year-olds display each of the small motor skills and signs of emerging literacy asked about in the survey. The size of the majority varies greatly across specific accomplishments, however. More than 9 out of 10 could button their own clothes and hold a pencil properly, and more than 8 out of 10 could identify the primary colors by name. Fewer, about 6 in 10, could count to 20 or recognize most letters of the alphabet.

Much smaller fractions of preschoolers exhibit any of the developmental difficulties, although a substantial minority display signs of physical activity-attention difficulties. At age 4, nearly 3 in 10 are said to be very restless and fidgety, and nearly 1 in 4 to have short attention spans. Nearly 1 in 8 is reported to be in less than very good health. About 1 in 13 speak in a way that is not understandable to a stranger or has a stutter or stammer.

The percentage of children displaying signs of emerging literacy and small motor skills increases with years of age within the 3- to 5-year age range, and with months of age among 4-year-olds. For example, the percentage of preschoolers reported to write their own names more than triples between ages 3 and 4, while the percentage recognizing most letters more than doubles. Other accomplishments show more moderate age differences. Developmental difficulties show much smaller changes across ages, and some show no change.

More girls than boys demonstrate each of the emerging literacy and small motor skills covered in the survey, while fewer girls exhibit signs of physical activity-attention difficulties or speech difficulties. Though sex differences are widespread, they are not large.

Hispanic preschoolers are reported to show fewer signs of emerging literacy and more indications of physical activity-attention difficulties than non-Hispanic children, and their general health status is not as good. Controlling for related risk factors such as the mother having limited education and minority-language status reduces these ethnic differences but does not eliminate them. Black preschoolers show fewer signs of emerging literacy than white preschoolers, and their health status is not as good. However, racial differences are wholly accounted for by related risk factors such as low maternal education, poverty, and single parenthood.

One of the questions addressed in the study is whether sociodemographic risk factors that have been found to be associated with learning difficulties after children start school are also correlated with the accomplishments and difficulties that children bring with them when they arrive at kindergarten. Five family risk factors are examined: the mother having less than a high school education; the family being below the official poverty line; the mother speaking a language other than English as her main language; the mother having been unmarried at the time of the child's birth; and only one parent being present in the home.

The relative importance of individual risk factors varies across developmental domains. Low maternal education and minority language status are most consistently associated with fewer signs of emerging literacy and a greater number of difficulties in preschoolers.

The risk factors are found to be associated with fewer accomplishments and more difficulties in the child. This remains true after other child and family characteristics are controlled in multivariate analyses. Of the developmental domains, only small motor development is not related to any of the sociodemographic risk factors after controlling for other risk factors and child characteristics. Maternal education is related to three domains (literacy-numeracy, physical attention-activity, and health) after controlling for other factors. Minority-language status is related to two domains (literacy-numeracy and health). Poverty and single parenthood are related to only one domain each, and unmarried motherhood to none, after controlling for other factors.

In general, the more risk factors to which the child is subject, the lower the number of accomplishments and the higher the number of difficulties he or she is likely to exhibit. For example, compared to children from families with none of the risk factors, children from families with three or more risk factors are five times as likely to be in less than optimal health, three times as likely to have speech difficulties, and twice as likely to display physical activity-attention difficulties. On average, these preschoolers display one and a half fewer signs of emerging literacy out of five than preschoolers with

no risk factors. In the multivariate analysis, the cumulative number of risk factors is found to be associated with each domain except small motor skills, after controlling for other factors.

Another question that the study addresses is whether attending Head Start, prekindergarten, or other center-based preschool programs is linked to more accomplishments and fewer developmental difficulties. The study shows that preschool participation is associated with higher emerging literacy scores in 4-year-olds. The increase, which amounts to an average of nearly one full accomplishment out of five, remains significant when controlling for other child and family characteristics. This benefit of preschool attendance accrues to children from both high-risk and low-risk family backgrounds. On the other hand, preschool attendance is found not to be associated with fewer behavioral or speech difficulties, or with better health status in preschoolers.

These findings about the importance of sociodemographic risk factors raise additional questions for future research. What are the antecedents and consequences of the risk factors? For example, family disruption or dissolution and adolescent pregnancy may be antecedents of poverty and single-parent household status for many children. What are the longer-term consequences of these risk factors for children? How do the antecedents and consequences of these risk factors affect the relationship between risk factors and developmental measures? Such investigation is not possible with the NHES data, and requires a more in-depth analysis, preferably with a longitudinal database. The results of such an analysis would greatly enhance our understanding of how sociodemographic risk factors operate and interact to affect children's development.

Teacher Perceptions Versus Preschoolers' Capabilities

It is interesting to note that a recent national survey of public school kindergarten teachers shows that most of them do not think that preschoolers have to display signs of emerging literacy and numeracy in order to be deemed ready for kindergarten entry (Heaviside and Farris 1993). For example, only 24 percent of the teachers consider it essential or very important for children to be able to identify primary colors and shapes at school entry, 10 percent think that knowing the letters of the alphabet is essential or very important, and just 8 percent think the same about counting to 20 or more. Yet the present study shows that a majority of American 4-year-olds *can* do these things before they start kindergarten, at least according to their parents.

This study shows that the month of birth affects the accomplishments of 4-year-olds in several domains. That is, the "older 4's" demonstrate more accomplishments (e.g., in literacy-numeracy) and slightly fewer difficulties (e.g., in speech) than the "younger 4's." For this reason, we may expect that more 4-year-olds would have acquired additional accomplishments or experience a diminution in difficulties in the months between the spring data collection and the start of the school year in the fall.

As noted above, 4-year-olds from high-risk family backgrounds are less likely than other children to show signs of emerging literacy prior to kindergarten. Yet, even among the 15 percent of 4-year-olds from families with three or more risk factors, substantial numbers show signs of emerging literacy. For example, according to their parents, 59 percent of these children could identify the primary colors, 53 percent could write their own names and were pretending to read, 43 percent could count to 20, and 40 percent could recognize most letters of the alphabet. Clearly, there is a good deal of developmental diversity among preschoolers who are about to enter kindergarten, even within a relatively disadvantaged subgroup.

In contrast to their tendency to downplay the significance of preacademic skills, a majority of public school kindergarten teachers rate certain health, communication, and behavioral characteristics highly important for school readiness. Specifically, 96 percent of the teachers consider it essential or very important that the child be "physically healthy, rested, and well-nourished" at school entry; 84 percent deem it essential or very important that the child "communicates needs, wants, and thoughts verbally in child's primary language;" and 60 percent give a similar rating to the criterion that the child "is not disruptive of the class" (Heaviside and Farris 1993). A substantial minority of teachers, 42 percent, consider it essential or very important that the child "sits still and pays attention;" 85 percent of the teachers think this attribute is at least "somewhat important" for kindergarten readiness.

Again, the present study shows that the majority of 4-year-old preschoolers in the United States seem to be able to meet these criteria. Although the characteristics assessed in the NHES:93 are not identical to those mentioned in the teachers' survey, the NHES:93 finds that most 4-year-olds are reported to be in very good or excellent health, could speak in a way that is understandable to strangers, do not have short attention spans, and are not overly restless or subject to frequent temper tantrums. Even among children from high-risk families, the majority are free of these potential impediments to their academic careers.

Unfortunately, the minorities of children who have these health, speech, and behavioral problems are considerably larger among preschoolers from high-risk families than among preschoolers from more advantaged families. For example, among 4-year-olds from families with three or more risk factors, compared to those from families with none of the risk factors, twice as many of the former group have short attention spans (37 percent versus 17 percent) and nearly double the number are said to be very restless (41 percent versus 22 percent). Three times as many have speech that is not understandable to strangers (14 percent versus 5 percent) or stutter or stammer (16 percent versus 5 percent). Almost five times as many are in less than very good health (23 percent versus 5 percent).

Attendance at Head Start or other preschool programs is not found to reduce the prevalence of these developmental difficulties. Ironically, what preschool programs seem to accomplish is to enhance the emerging literacy and numeracy skills of preschoolers. Yet the latter are qualities that teachers do not deem to be very important for school readiness. The present study includes a wide range of center-

based programs for preschoolers. It may be that an analysis including measures of program quality such as child-staff ratio would show more of an effect of high-quality programs on areas of child development and well-being other than emerging literacy.

Implications for Educational Research and Planning

The results of this study have three sorts of implications for educational research and the planning of educational programs for young children. First, the findings point to a need for innovative approaches to the provision of early education services to disadvantaged children. As previous studies have shown (Haskins 1989; Lee, Brooks-Gunn, and Schnur 1988; McKey et al. 1985; White 1986), existing preschool programs have beneficial effects in the area of emerging literacy and numeracy. But they do not appear to be ameliorating the behavioral, speech, and health difficulties of disadvantaged preschoolers. The need for earlier and more effective interventions for young children with special educational needs has been recognized in federal legislation (Gallagher 1989). What has yet to be established is whether early childhood educators know how to make a difference in these areas.

Second, the results emphasize the value of a multifaceted concept of educational risk. Five different risk factors are employed in the present study. All are found to have some relationship to preschoolers' accomplishments and difficulties, although the pattern of relationships varies across developmental domains. Many observers believe that low family income is *the* key factor behind educational failure, but the results of this research do not support this view. Low maternal education, minority-language status, and family structure are often as good or better predictors of the child's developmental accomplishments and difficulties.

Third, by showing the considerable variation that exists in the accomplishments and difficulties of children about to start school, the study highlights the challenges that kindergarten teachers face in meeting the needs of children who are not only demographically but developmentally diverse. Teachers must maintain the interest and promote the growth of children who have already demonstrated signs of early literacy and numeracy while simultaneously encouraging the emergence of basic skills in children who have not yet acquired them. Similarly, they must meet the needs of children with difficulties while reserving sufficient attention and effort for those with few or no difficulties.

Achieving this goal requires that early childhood programs and classrooms be organized to meet the needs of children at all levels of development, that teachers be selected who have the energy, warmth, and imagination to respond to young children with varying capabilities and needs, that these teachers be appropriately trained and provided with sufficient resources and assistance so they do not have to neglect some children in order to nurture others. There is still much to learn about how well kindergarten programs around the country are now meeting these requirements and about ways in which they might serve young children in the future.

Finally, as noted earlier in this report, this research is based on the reports of parents about their preschoolers. While parent reports provide important insights into the developmental accomplishments and difficulties of children, a more complete assessment of children's developmental levels and school readiness would require the collection of information from parents, schools or programs, and the children themselves. Such an effort is now in the developmental stages at the National Center for Education Statistics.

Survey Methodology and Data Reliability

The 1993 National Household Education Survey (NHES:93) is a telephone survey conducted by Westat for the U.S. Department of Education's National Center for Education Statistics (NCES). Data collection took place from January through April of 1993. When appropriately weighted, the sample is nationally representative of all civilian, noninstitutionalized persons in the 50 States and the District of Columbia. The sample was selected using random digit dialing (RDD) methods, and the data were collected using computer assisted telephone interviewing (CATI) technology.

The School Readiness component of the NHES:93, which is the basis of this report, sampled 3- to 7-year-olds and 8- and 9-year-olds enrolled in second grade or below. Two instruments were used to collect information on the variables related to the school readiness of these children. The first instrument, a Screener administered to an adult member of the household, was used to determine whether any children of the appropriate ages lived in the household, to collect information on each household member, and to identify the appropriate parent/guardian to respond for the sampled child. If one or two eligible children resided in the household, interviews were conducted about each child. If more than two eligible children resided in the household, two children were randomly sampled as interview subjects. A School Readiness (SR) interview was conducted with the parent/guardian most knowledgeable about the care and education of each sampled child, usually the child's mother.

Response Rates

The NHES:93 survey completed Screeners with 63,844 households, of which 9,936 contained at least one child eligible for the SR component. A sample of 12,905 children was selected for the SR component from these households. The response rate for the Screener was 82 percent. The completion rate for the SR interview, or the percentage of eligible sampled children for whom interviews were completed, was 90 percent, or 10,888 interviews. Thus, the overall response rate for the SR interview was 74 percent (the product of the Screener response rate and the SR completion rate). This report is based on a subset of the total SR population: preschoolers, that is, children age 3 and older who are not yet enrolled in kindergarten. The unweighted number of cases included in this analysis is 4,423. The number of 4-year-old preschoolers was 2,000.

For the NHES:93, item nonresponse (the failure to complete some items in an otherwise completed interview) was very low. The item nonresponse rates for most variables in this report were less than 1 percent. Items with missing responses (i.e., don't know, refused, or not ascertained) were imputed using a hot-deck procedure. As a result, no missing values remain.

Data Reliability

Estimates produced using data from the NHES:93 are subject to two types of error, sampling and nonsampling errors. Nonsampling errors are errors made in the collection and processing of data. Sampling errors occur because the data are collected from a sample rather than a census of the population.

Nonsampling Errors

Nonsampling error is the term used to describe variations in the estimates that may be caused by population coverage limitations and data collection, processing, and reporting procedures. The sources of nonsampling errors are typically problems like unit and item nonresponse, the differences in respondents' interpretations of the meaning of the questions, response differences related to the particular time the survey was conducted, and mistakes in data preparation.

In general, it is difficult to identify and estimate either the amount of nonsampling error or the bias caused by this error. In the NHES:93, efforts were made to prevent such errors from occurring and to compensate for them where possible. For instance, during the survey design phase, focus groups and cognitive laboratory interviews were conducted for the purpose of assessing respondent knowledge of the topics, comprehension of questions and terms, and the sensitivity of items. The design phase also entailed over 500 staff hours of CATI instrument testing and a pretest in which over 275 interviews were conducted.

An important nonsampling error for a telephone survey is the failure to include persons who do not live in households with telephones. About 90 percent of all 3- to 7-year-olds live in households with telephones. Estimation procedures were used to help reduce the bias in the estimates associated with children who do not live in telephone households.[33]

Test-Retest Reliability of Developmental Items

Response variance is another important source of nonsampling error in surveys. In a reinterview study, parents of 360 preschoolers who had been asked the developmental items were given the same questions again, about 2 weeks after the original interview (Brick, Rizzo, and Wernimont 1993). The agreement between the parents' original responses to the items and their responses on reinterview ranged from 81 percent to 95 percent. The median item had an agreement level of 93 percent. The reliability

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[33]For additional information on telephone coverage issues and estimation procedures to correct for coverage biases, see J.M. Brick and J. Burke (1992), *Telephone Coverage Bias of 14- to 21-year-olds and 3- to 5-year-olds*. Washington, DC: U.S. Department of Education, National Center for Education Statistics, NCES 92-101.

coefficient for the items, i.e., the correlation coefficient between the initial response and the reinterview response, ranged from r = .49 to r = .79. The median r was .65.

Another measure of reliability is the index of inconsistency, an index of the proportion of total variability in a measure that is contributed by random response error (see Brick, Rizzo, and Wernimont 1993). An inconsistency index of less than 20 represents low relative response variance; a value between 20 and 45 represents moderate relative response variance; and values above 45 represent high relative response variance. The inconsistency values for the individual developmental items ranged from 20.8 to 56, with a median value in the moderate range, 35.9. One of the items that showed a high inconsistency value was the health rating item. A composite score based on all the items had a low inconsistency value, 13.

These findings indicate that some of the differences across indicators and scales in the proportion of variation accounted for by risk factors and control variables may be due to differences in the relative reliability of the developmental measures.

The table below summarizes the median percent agreement, the median inconsistency index value, and the median reliability coefficient for each of the developmental domains covered in the set of items. (In cases where the domain contained only one item, the value for the individual item is shown.)

Table 11.— Agreement and inconsistency in the interview and reinterview responses to developmental accomplishment and difficulty items

	Median percent agreement	Median inconsistency index	Median r
Developmental domain			
Emerging literacy	89%	25	.77
Small motor development	93	30	.69
Physical activity-attention	85	37	.65
Speech development	95	37	.63
General health[1]	91	54	.49

[1] Single-item indicator.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Survey, 1993.

Sampling Errors and Weighting

The sample of telephone households selected for the NHES:93 is just one of many possible samples that could have been selected. Therefore, estimates produced from the NHES:93 sample may differ from estimates that would have been produced from other samples. This type of variability is called sampling error because it arises from using a sample of households with telephones, rather than all households with telephones.

The standard error is a measure of the variability due to sampling when estimating a statistic. Standard errors for estimates presented in this report were computed using a jackknife replication method. Standard errors can be used as a measure of the precision expected from a particular sample. The probability that a complete census count would differ from the sample estimate by less than 1 standard error is about 68 percent. The chance that the difference would be less than 1.65 standard errors is about 90 percent, and that the difference would be less than 1.96 standard errors, about 95 percent.

Standard errors for all of the estimates are presented in the tables. These standard errors can be used to produce confidence intervals. For example, an estimated 78 percent of preschoolers are able to identify all the primary colors. This figure has an estimated standard error of 0.8 percent. Therefore, the estimated 95 percent confidence interval for this statistic is approximately 76 to 80 percent.

All of the estimates in the report are based on weighting the observations using the probabilities of selection of the respondents and other adjustments to partially account for nonresponse and coverage bias. These weights were developed to make the estimates unbiased and consistent estimates of the national totals.

In addition to properly weighting the responses, special procedures for estimating the statistical significance of the estimates were employed because the data were collected using a complex sample design. Complex sample designs, like that used in the NHES:93, result in data that violate some of the assumptions that are normally required to assess the statistical significance of the results. Frequently, the sampling errors of the estimates from the survey are larger than would be expected if the sample was a simple random sample and the observations were independent and identically distributed random variables.

Replication methods of variance estimation were used to reflect the actual sample design used in the NHES:93. A form of the jackknife replication method was used to compute approximately unbiased estimates of the sampling errors of the estimates in the report. The jackknife methods were used to estimate the precision of the estimates of the reported national totals, percentages, and regression parameters. In addition, chi-squared tests of independence were used to evaluate the statistical significance of the overall association between a child or family characteristic (e.g., age) and a developmental indicator (e.g., proportion counting to 20). These chi-squared tests of independence were

adjusted for the complex sample design using the procedures described by Rao and Thomas (1989). In essence, these adjustments account for the lack of independent, identically distributed random variables that are usually assumed when chi-squared tests of independence are computed. To test the differences between two categories (e.g., 3- versus 4-year-old preschoolers), student's *t* statistic was employed, using unbiased estimates of sampling errors derived by the replication methods mentioned above.

As the number of comparisons at the same significance level increases, it becomes more likely that at least one of the estimated differences will be significant merely by chance, that is, it will be erroneously identified as different from zero. Even when there is no statistical difference between the means or percentages being compared, there is a 5 percent chance of getting a significant F or *t* value from sampling error alone. As the number of comparisons increases, the chance of making this type of error also increases.

A Bonferroni adjustment procedure was used to correct significance tests for multiple comparisons. This method adjusts the significance level for the total number of comparisons made with a particular classification variable. All the differences cited in this report are significant at the 0.05 level of significance after a Bonferroni adjustment.

Poverty Measure. The poverty measure presented in this research was developed by combining information about household composition and household income. The count of family members was based on the relationships among the household members unless the child had no parents in the household, in which case the total number of household members is used. Household income was collected in increments of $5,000 up to $40,000, the categories relevant to the measure of poverty. Because exact household income is not available, this poverty measure is an approximation. The household is considered poor if

- The number of family members is 3 or less and household income is $10,000 or less;
- The number of family members is 4 or 5 and household income is $15,000 or less;
- The number of family members is 6 or 7 and household income is $20,000 or less;
- The number of family members is 8 or 9 and household income is $25,000 or less;
- The number of family members is 10 or 11 and household income is $30,000 or less; or
- The number of household members is 12 and household income is $35,000 or less.

This measure of poverty results in 24 percent of preschoolers being classified as in poverty. This percentage is similar to the traditional measure of poverty status (U.S. Bureau of the Census 1993).

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Appendix A

NHES:93 Interview Items Concerning Developmental

Accomplishments and Difficulties

NHES:93 Interview Items Concerning Developmental Accomplishments and Difficulties

DPINTRO. These next questions are about things that different children do at different ages. These things may or may not be true for (CHILD).

R14. Can (CHILD) identify the colors red, yellow, blue, and green by name? Would you say...

All of them 1
Some of them, or 2
None of them? 3

R15. Can (he/she) recognize...

All of the letters of the alphabet 1
Most of them 2
Some of them, or 3
None of them? 4

R16. How high can (CHILD) count? Would you say...

Not at all 1
Up to five 2
Up to ten 3
Up to twenty 4
Up to fifty, or 5
Up to 100 or more? 6

R17. Can (CHILD) write (his/her) first name, even if some of the letters are backwards?

YES 1
NO 2

R18. Can (he/she) button (his/her) clothes?

YES 1
NO 2

R19. Does (he/she) hold a pencil properly?

YES 1
NO 2

R20. Does (he/she) mostly write and draw rather than scribble?

YES 1
NO 2

R21. Does (he/she) trip, stumble, or fall easily?

YES 1
NO 2

R23. Does (CHILD) often have temper tantrums?

YES 1
NO 2

R25. Is (he/she) very restless, and does (he/she) fidget a lot?

YES 1
NO 2

R26. Does (he/she) have a very short attention span?

YES 1
NO 2

R27. When (he/she) speaks, is (CHILD) understandable to a stranger?

YES 1
NO 2

R28. Did (he/she) start speaking later than other children you know?

YES 1
NO 2

R29. Does (CHILD) stutter or stammer?

YES 1
NO 2

R86. Is (CHILD) able to read story books on (his/her) own now?

YES . . . . . 1 (GO TO R87)
NO . . . . . 2 (GO TO R89)

R87. Does (CHILD) actually read the words written in the book, or does (he/she) look at the book and pretend to read?

READS THE WRITTEN WORDS	1	(GO TO R88)
PRETENDS TO READ	2	(GO TO R90)
DOES BOTH	3	(GO TO R88)

R89. [Although (CHILD) doesn't yet read story books on (his/her) own,] Does (he/she) ever look at a book with pictures and pretend to read?

YES	1	(GO TO R90)
NO	2	(GO TO R91)

R90. When (he/she) pretends to read a book, does it sound like a connected story, or does (he/she) tell what's in each picture without much connection between them?

SOUNDS LIKE CONNECTED STORY	1
TELLS WHAT'S IN EACH PICTURE	2
DOES BOTH	3

R106. In general, would you say that (CHILD'S) health is...

Excellent	1
Very good	2
Good	3
Fair, or	4
Poor?	5

NOTE: Question R88 is not shown because it was not used in the development of the reading accomplishment measure.

Appendix B

Regressions Testing Interaction Between

Preschool Program Participation and Sociodemographic Risks

Regressions Testing Interaction Between
Preschool Program Participation and Sociodemographic Risks

Following analyses that related participation in preschool programs to children's accomplishments and difficulties, another set of regressions was run. These analyses tested whether the benefits of preschool attendance were greater for at-risk children than for other children, i.e., whether there was a significant interaction between program participation and risk status. The equations included both the program participation term and three dichotomous interaction terms. One variable was coded "1" if the child was subject to at least one sociodemographic risk factor *and* had attended a preschool program. Otherwise, the variable was coded zero. Similarly, the second variable indicated whether the child was subject to two factors and had attended preschool; and the third, whether the child was subject to three or more risk factors and had been to Head Start or prekindergarten. If program attendance had a particularly beneficial effect on the development of at-risk children, one or more of these terms should show a regression weight that was positive and significantly different from zero. The addition of the interaction terms should also produce a significant increase in the total variance accounted for, above and beyond that accounted for by the program participation indicator, the risk index, and the control variables. Three separate interaction terms were used to examine whether preschool programs had their greatest benefit at low, moderate, or high levels of risk. The separate terms also allowed for the possibility of a curvilinear relationship between risk and program effects.

As shown in appendix table B-1, no solid evidence of significant interaction between a child's risk status and the developmental effects of preschool attendance was found. In the literacy-numeracy domain, however, there was a marginal increase in the amount of variation accounted for when interaction terms were added to the emerging literacy analysis (ΔR^2 = 0.6 percent; $F(3, 50) = 3.66$; $p < .10$).

Table B-1.— Linear regression models relating developmental accomplishment and difficulty indexes to preschool program attendance, sociodemographic risk index, interaction of program attendance and risk, and control variables: 4-year-old preschoolers, United States, 1993.

Independent variables	Developmental index (dependent variable)									
	Emerging literacy/numeracy		Small motor skills		Physical activity–attention difficulties		Speech difficulties		Health problem	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
Intercept	4.38**	.16	2.78**	.07	.27	.14	.00	.06	1.03**	.03
Child attended preschool (main effect)	.58**	.10	.05	.05	.13	.06	.04	.04	.02	.02
Program participation and at least one risk factor (interaction)	.20	.12	.02	.06	-.08	.08	.00	.06	-.01	.03
Program participation and at least two risk factors (interaction)	.35	.16	-.05	.06	.09	.13	-.04	.07	-.02	.03
Program participation and three or more risk factors (interaction)	.07	.17	.15	.08	-.23	.15	-.01	.10	-.02	.02
Risk index	-.52**	.07	-.04	.03	.25**	.05	.07*	.03	.07**	.02
Controls										
Sex (male child)	-.37**	.08	-.18**	.03	.21**	.06	.16**	.03	.02	.02
Black non-Hispanic child	.09	.11	.12*	.05	-.14	.09	-.00	.05	-.00	.03
Hispanic child	-.60**	.11	-.07	.04	.38**	.08	.05	.05	.13**	.03
Other race	.14	.15	.05	.10	.07	.15	.23	.12	.14*	.05
Number of children under age 9 in household	-.14*	.05	.04	.02	.04	.05	.02	.02	-.00	.01
Month of birth	-.07**	.01	-.02	< .01	.01	.01	.01	< .01	-.00	< .01
Percentage of variance accounted for by model (R^2)	25.3%		5.3%		8.7%		4.2%		8.1%	
F (11, 50)	40.12**		6.51**		8.48**		6.16**		5.83**	
Increase in variance accounted for due to inclusion of interaction terms variable (ΔR^2)	0.6%		0.3%		0.2%		0.1%		< 0.1%	
F (3, 50)	3.66*		1.15		0.79		0.38		0.18	

B = unstandardized regression coefficients
s.e. = standard errors
** $p < .01$
* $p < .05$
* $p < .10$

NOTE: Four-year-old preschoolers are those who have not yet entered kindergarten or primary school.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey, 1993.

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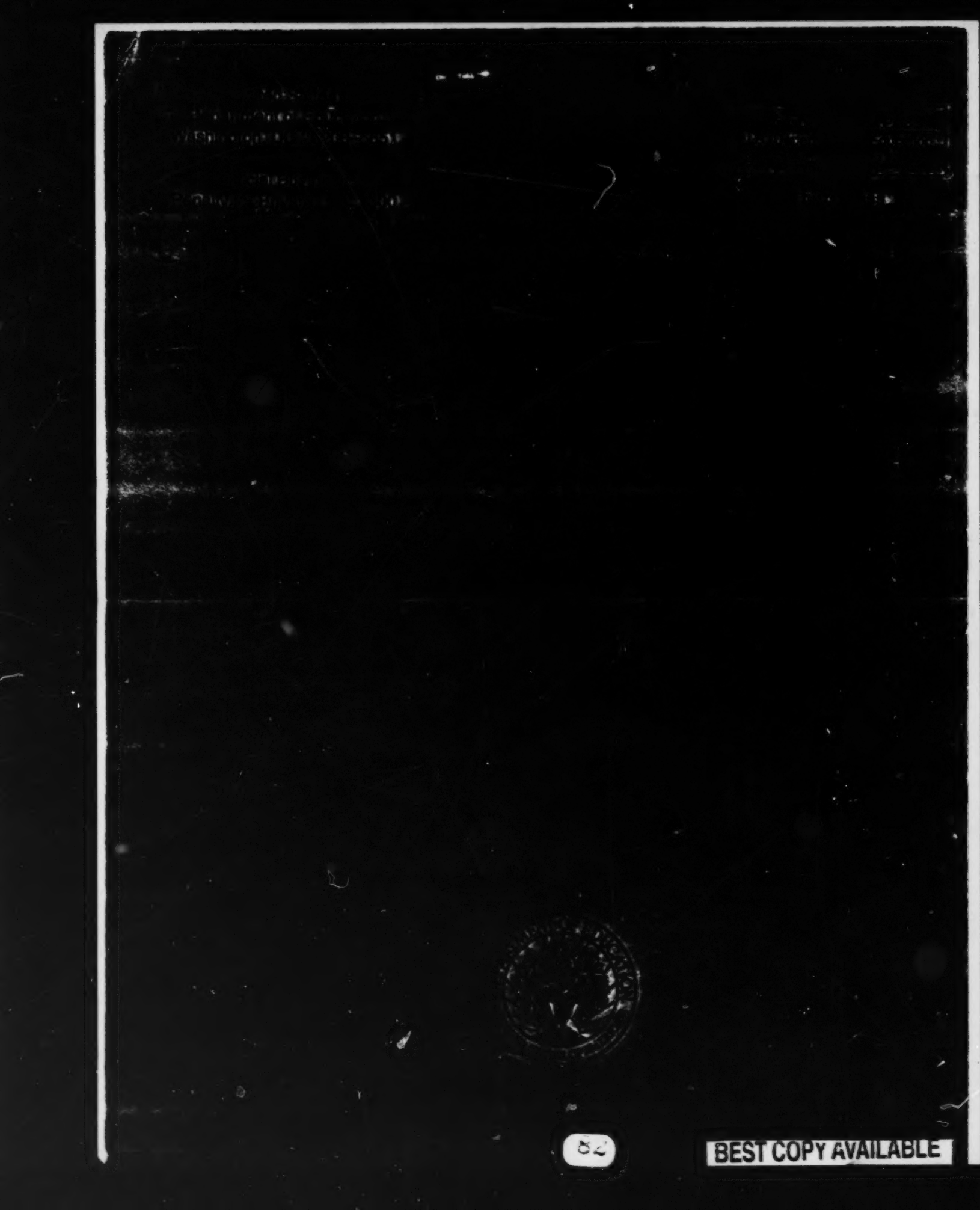

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